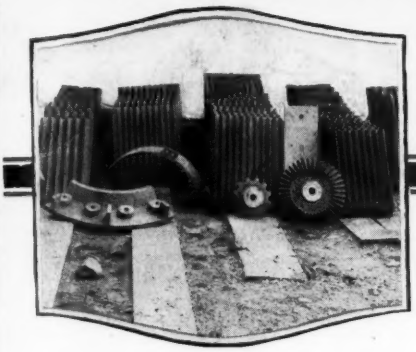
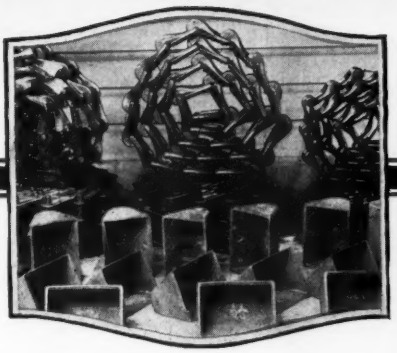
Pit and Quarry

SAND • GRAVEL • STONE

HANDLING • CRUSHING • SCREENING • WASHING





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M & M manganese steel carries the Moore & Moore guarantee of quality, backed by years of experience.

MOORE & MOORE, INC.

READING, PENNA.

November, 1922

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Circulation 7,200 copies

"Crane in operation two years—Not a dollar for replace parts."

"Our Brownhoist has now been in operation two years and we have not spent one dollar for replace parts.
"The crane has operated night and day for a considerable part of this period and we have used it for handling scrap, billets, finished material and coal.

"We feel that this crane has given us splendid service and if we were to purchase another crane we would certainly buy a Brownhoist."

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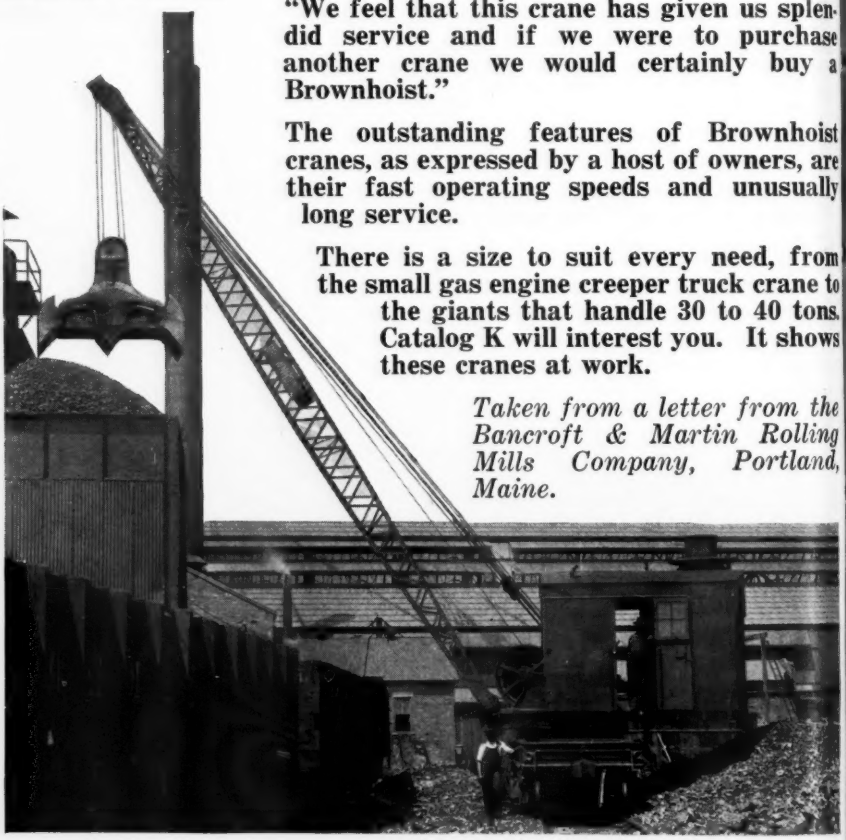
There is a size to suit every need, from the small gas engine creeper truck crane to the giants that handle 30 to 40 tons. Catalog K will interest you. It shows these cranes at work.

Taken from a letter from the Bancroft & Martin Rolling Mills Company, Portland, Maine.



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BROWNHOIST

MATERIAL HANDLING MACHINERY

Pit and Quarry

Member Audit Bureau of Circulations
A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7 CHICAGO, ILL., NOVEMBER, 1922 No. 2

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All Seasons

"Sure we work all year around," said the runner, "why not?"

Well, why not? The 3-A is a real shovel. The Sandusky Portland Cement Company depend on it to keep a big plant supplied with raw material, 1000 cubic yards of marl a day.

It's sticky stuff in wet weather. In winter the frost goes deep. But neither condition can phase the Thew. It keeps right on digging and loading into the cars above.

This company has used a Thew in the pit for twelve years. They know it's the thing to do.

You can't go wrong on the 3-A. Write for YOUR copy of Bulletin 114.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Thew
Power Shovels

Pit and Quarry

Vol. 7 Chicago, Ill., November, 1922 No. 2

A Record Year

THERE seems to be every reason to expect that the production of Portland cement for the present year will go considerably ahead of any previous record.

The highest production so far recorded was in 1920, amounting to 100,023,245 barrels. The production of the present year up to the last of September was over 81,563,000 barrels, and a proportional estimate for the remaining three months of the year, based on the relationship which these three months usually hold to the first nine months of the year, would lead us to expect a total production for 1922 of about 110,000,000 barrels or practically 10 per cent increase over the former high figure.

This depends to some extent, of course, upon whether or not a reasonable supply of cars can be secured, both for the cement itself and for other materials required to mix with it. The sack situation is also becoming acute in some localities and lack of sufficient supply of sacks may reduce the total slightly. It would seem impossible, however, to think of any combination of circumstances which would cut down the production sufficiently to prevent us from having a record year.

In considering this large production of cement, it should also be taken into consideration that cement is never used alone, but always in combination with other pit and quarry materials, so that it will be reasonable to expect a record output in other branches of these industries as well as in that of Portland cement.

The preliminary figures of the Geological Survey, which it is hoped may be ready to be given out early in January, will be looked forward to with unusual interest. It is pertinent to suggest, therefore, that producers make no delay in sending in such returns as they are asked for, in order that the complete figures may be compiled as early as possible.

Six by Nine

WHEN PIT AND QUARRY was established in its convenient 6x9 size, it was considered almost an outlaw in the publishing field, so far as size is concerned, and it had to fight several wordy battles, especially with advertisers, in order to vindicate the appropriateness of its size of page.

This is all past history, however, as the matter was considered settled long ago, especially when advertisers found readers were carrying PIT AND QUARRY around in their pockets and thus keeping in close touch with its pages.

Our judgment in this matter of size seems to have been justified by the fact that now more than sixty class publications have adopted the 6 x 9 form.

The latest of these is Engineering and Contracting of this city, who in the introduction of their new volume in October, came down from the so-called "standard" 9 x 12 size. In making this change, Engineering and Contracting says:

"The standard size of engineering text books has long been 6 x 9 inches, and the same is true of engineering

catalogs. This size has proved to be large enough for illustrations and tables, and it is really surprising, therefore, that it has not been already adopted by more 'class periodicals.'

"Ease of handling and filing, the fact that it will go into any bookcase, and will fit in any coat pocket, are the three features that appeal strongly to readers."

Heavy Bond Issues

SALES of long-term municipal bonds during September, totaled $94,590,507 as against $66,360,551 for August and $88,656,257 in September, 1921. This represents the highest total value for the month of September, realized in any similar period during the last thirty years. The total for the nine months, $905,770,787, represents the highest total for that period, since 1892. Short-term securities totaled $47,831,000, of which $42,410,000 was issued by New York City alone.

Records kept by the *Commercial and Financial Chronicle* further show that the number of municipalities issuing permanent bonds and the number of separate issues made during September were 442 and 615, respectively as against 516 and 663 for August and 377 and 478 for September, 1921.

Among the more important issues were: Chicago, $8,095,000 4s at 98.639, a basis of about 4.16 per cent; Illinois, $6,000,000 4s at 99.686, a basis of about 4.03 per cent; Detroit, $5,009,000 4¼s; Missouri, $5,000,000 4½s at par, plus a premium of $32,215, equal to 100.644, a basis of about 4.35 per cent; Milwaukee County, Wis., $4,300,000 5s at 107.36, a basis of about 4.20 per cent; Buffalo, $3,580,000 4¼s at 103.109, a basis of about 3.90 per cent; Michigan, $2,000,000 4s and $1,000,000 4¼s at 100.012, a basis of approximately 4.08 per cent.

Pay Loads and Dead Loads For Trucks

EVERY user of trucks knows that the loads vary in tonnage according to the size of the trucks, so much so, that, in selling trucks, it is common to speak of them as two-ton, three-ton and five-ton cars.

For most heavy hauling, as with stone, gravel, sand and similar materials, a large capacity truck is used. This has brought the five-ton car into common use. Most trucks are built to carry an overload, so that many trucks carry loads up to six and seven tons.

This was excellent practice from an economical standpoint, for naturally the larger the pay load the more economical the cost of hauling.

This brings to our attention the hauling of loads over improved roads. With good roads it is possible to increase the size of the pay loads, but it has been found that the heavy loads that the large size trucks handle is very hard on the light surface that most states are building. This being the case, instead of building roads of such depth as will carry the loads that can be transported on modern vehicles, many states are passing laws limiting the size of loads.

Thus at least seventeen states are now forcing truck owners to carry a limited load. In most cases ten tons is set as a maximum pay load and dead load combined.

In order to enforce this law some states now have inspectors on the roads looking out for heavily laden trucks. When found the truck is stopped, weighing jacks are placed under each wheel and the total weight of the load is found. If the law is being broken, part of the load is taken off at once and the offender is summoned to the traffic court to be fined.

These facts show the need of great care in selecting the trucks when buying. If the maximum pay and dead

load is ten tons, then the dead load must be the minimum consistent with safety and low maintenance cost, in order to carry the maximum pay load.

Thus if a truck weighs five tons it can only carry a five-ton pay load. Add to the weight of the truck and the pay load is cut down accordingly.

However, it would be a poor investment to buy a truck built so light that it would be always breaking down under its load. The kind of truck to purchase is of ample strength and as light of weight as is consistent with safe operation. Then the maximum pay load can be hauled. This is what every truck owner desires.

These state laws will compel the truck manufacturers to redesign their machines so as to conform to the requirements of those states limiting the combined loads on trucks.

Solving the Labor Problem

IN spite of the fact that there are still cries from many sections of the country of men being unemployed, yet many quarrymen know to their sorrow that they cannot obtain all the labor that they need.

Within a week of writing this article, one quarryman stated that if fifty men applied for work at his plant the next day he would gladly put every one of them to work, while in a new operation recently another pitman was attempting to unload a steam shovel with a foreman and two workmen. These incidents show how short operators are in some sections of the country.

An explanation of this lies in the fact that laboring in quarries is hard work, and in some branches is specialized laboring. The result is that many men are not trained to the work and after trying it for a few days move on looking for easier jobs. Then, too, with the prevailing prices paid for quarry products, it is not possible for operators to pay men an extra high wage in order to attract and hold them. This means much in solving such a problem.

If workmen cannot be obtained, there is but one expedient for operators and that is to turn to machinery. Even in the smaller operations this will be found necessary.

What to Do?

The following news dispatch, which appeared in the San Diego (Cal.) *Union* of Oct. 9, is typical of what might be written from many parts of the country:

El Centro, Oct. 8.—Members of the board of supervisors and county engineers yesterday visited the county's gravel pit at Frink, 15 miles north of Niland, to obtain a better idea what to do with the plant. The supervisors last week purchased the plant for the county from the county highway commission, after arranging for the discharge of the commission because its work in the county paving program has been completed.

Instead of purchasing its gravel for road construction from private companies, the highway commission bought the Frink pit and equipment outright, paying approximately $125,000. Now that the road program is finished the supervisors are trying to decide whether to continue operating the gravel pit to procure material for road building and repairing, or to sell the plant to a private corporation. Engineers reported to the supervisors that it costs about $100 a day to keep the plant in operation.

Under the law the supervisors can neither operate the plant and sell the product to the public, nor lease it and receive rentals for it, although it could be leased at a good profit to the county.

Sales of explosives in the United States during August for domestic consumption amounted to 603,842 kegs of black powder, 3,280,800 pounds of permissibles, and 18,114,953 pounds of other high explosives. These figures are based upon manufacturers' reports to the federal Bureau of Mines and represent about nine-tenths of the explosives industry.

Angle Bars in Screens

SCREENS for rock crushing plants can and do in many cases regulate the output of the crusher. It is but natural that if the screens become full and choked they will not function and the crusher must be stopped until the screens can take care of the stone.

Thus a screen must be of a large size, for only a small part of a circular screen is used. This means that the diameter of the screen must be much larger than it would be if the greater part of the screen could be used.

It is but natural that a screen 5 feet in diameter should take more power to operate if, even without a load, than one but 3 feet in diameter. If it is possible to make the 3 foot screen do as much work as a 5 or 6 foot screen, then it is evident that the plant owner is getting efficiency and making a decided saving.

It is possible to materially increase the capacity of screens by putting angles iron in them.

Fig. 1

It can be seen by Fig. 1, that with stone being discharged into the center of the screen, and revolving as indicated by the arrows, that the stone is carried up as shown by the hatching in the sketch. As soon as the stone gets to the highest point it slides back towards the center and it is by this action that the stone is kept in motion and is caused to be screened. The screens being divided into sections with different size rings and being on a slope, the stone moves forward through the different sections, thus being graded.

If too much stone enters the screen it occupies the same area on the screen as the smaller amount, only it is deeper, thus the stone does not go through the screen faster, but if anything is slightly retarded, so that the screen can become choked.

To overcome this objection the stone must be spread over a larger area, and to do this the angles are placed in the screens. These hold the stone so that it is carried up a quarter turn before it begins to fall back towards the center. Thus as shown by Fig. 2, more than one-quarter of the area of the screen will be taken up in screening stone and there will be some depth, yet the additional area will allow of this depth being taken care of without stopping the screen.

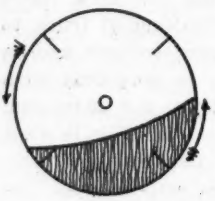


Fig. 2

The angles should be from 3 to 4 inches deep so that they will be large enough to carry a bulk of stone on them. For this reason the angles must be well bolted to the screen. In spacing the angles they can be placed at the quadrant of the circle, or instead of 90 degrees apart two can be placed 80 degrees apart, leaving 100 degrees between the two sets of angles. This spacing keeps the mass of stone together a little more than does the regular spacing. This latter spacing is all right for the larger diameter screens, while to place them on the quadrants is better in the smaller diameter revolving screens.

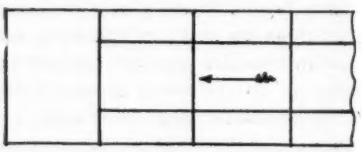


Fig. 3

The angles should be placed in each section of the screen except the last

one. Here the largest size stones go and by the time the stone has reached this section most of it has passed through the rings. This is illustrated in Fig. 3.

If the fine screenings are to be separated from the dust, then a dust jacket should be placed around the first section of the screen which is graded for ¼-inch stone.

It is in this way that a set of screens can be fixed up to take care of a larger amount of stone. It also means that the stone is likely to be better graded, for the stone, as explained, will go over a larger area of the screen and instead of sliding so much on the metal it is carried up and dropped down.

Where washing is done in screens this is also a help in doing the washing, giving a much cheaper product. It is by these things that can be done for little money that a plant can be improved.

Storing Stone at the Crusher

WITH a quarry opening located well up on the side of a high hill, more than one hundred feet in elevation above the crusher plant, which was situated alongside of a railroad siding, the operator used large cars and brought his blasted rock from the ledge to a trestle over the crusher, dumping it in a pile.

As there was plenty of room under the dumping trestle behind the primary crusher, the quarryman made use of this space by working his cars hard and storing uncrushed stone around the crusher. To him this seemed an excellent piece of business and he believed that it paid well, saying that if there was a temporary accident in the quarry so that stone could not be delivered, he had a reserve pile to keep his crushers going.

This was true, but it was the only advantage gained, and the advantage was slight as compared to the extra cost that was added to his crushing. He was able to store about one hundred tons of stone in this manner and by so doing he made all his stone cost more.

First, he always had to use two men to feed his crusher. As he worked back into his storage pile he was compelled to use a third and sometimes a fourth man to use pick and bar to loosen the stone from the pile, so that the crusher could be kept going. Naturally in dumping the stone from the crusher it became packed into a tight, hard mass. Then, too, it was necessary at times to use men with wheelbarrows to bring stone from the back of the storage pile to the crusher.

When these things did not have to be done it meant that the operator had a hundred tons of blasted rock for which money had been spent for quarrying, tied up indefinitely. This alone meant an added cost to the stone.

From these things it can be seen that the added cost going on continually more than offsets any advantage that may accrue from overcoming a delay due to an accident in the quarry.

This shows that it would have been much cheaper to have built a chute or slide from the trestle to the crusher so as to prevent any rehandling or storing of the stone before being crushed.

It is safe to say, as a general proposition, that in crushed stone quarries all storage should be after the stone has been crushed. It can then be stored cheaper and is ready for sale at any time.

Herbert C. Follinger, manager of the Chicago office of the Chain Belt Company, died of pneumonia at his home in Chicago on September 27th.

Crushing Plant of American Gypsum Co. Machine Shop in Center Foreground

American Gypsum Company Mining Rock of Big New York Deposit

TOWARDS the large end of the pear-shaped Akron gypsum "basin," located some 20 miles east of Buffalo, New York, is the mine of the American Gypsum Company. This Akron basin, the outlines of which have been fairly well defined by the sinking of shafts and core drill holes, is some 2 miles long with a maximum width of one mile. The deposit of gypsum, as mined, consists of a 4 to 5 foot bed of light colored crystalline or granular gypsum overlain by thinly bedded impure limestone 25 to 50 feet in depth. These limestone are in turn covered by a mantle of glacial clay ranging from a few feet up to 25 feet in thickness.

Analysis of various gypsum deposits in the state of New York, indicate that the gypsum content of the rock ranges from between the general limits of 65 and 95 per cent, gradually improving towards the western end of the section, particularly in Erie county where the Akron basin is located. The rock in this part is also lightest in color and yields a plaster that is almost white. Analysis of material from Erie county discloses the following chemical constitution:

SiO_2	0.51
Al_2O_3	1.19
Fe_2O_3	.79
CaO	30.62
MgO	1.20
SO_3	43.59
CO_2	1.02
H_2O	20.52
	99.44
Gypsum calculated	93.74

The impurities of the rock are what its stratigraphic associations lead one to expect. The principal foreign ingredients are lime and magnesia carbonates, quartz and clay with most of the iron shown by the analysis probably present in the clay. The high percentage of magnesia in the rock,

which is far in excess of the proportions found in dolomite, is quite a striking feature of the material, as it indicates the presence of free carbonate.

Theories on the origin of the gypsum formation are centered mostly around the belief that the deposits are the result of the evaporation of surface waters. The gypsum is hardly the result of the action of acid waters upon limestone, for the change from limestone to gypsum involves an increase of 90 per cent in the volume. This would hardly occur without general disturbance of the adjacent strata, but the beds of gypsum encountered are undisturbed, neither are they faulted or fractured so as to permit the easy circulation of waters.

The best explanation is that the Akron gypsum is the result of the evaporation of salt waters of an ancient sea, which also gave rise to the celebrated salt mines in this section of New York. The occurrence of shales between the layers of gypsum is accounted for by the supposition that the supply of salt water from which the gypsum was precipitated was cut off for a while, during which time the basins were probably invaded by land drainage and shales were accumulated in considerable thickness. The renewal of the early conditions with a fresh supply of sea water, started the precipitation of gypsum again, laying down that material that is found in the higher horizon.

The mine and mill of the American Gypsum Company are situated 2½ miles northeast of Akron on the boundary line between Genesee and Erie counties. The company owns mineral rights on both sides of the line, and has recently acquired other rights by the purchase of gypsum bearing lands from the Tonawanda tribe of Indians. These latter holdings will be developed by the sinking of a mine and the erection of a large mill.

The present mine is entered by means of a vertical shaft 60 feet deep which is divided into 3 compartments: one, 5x8 feet, for air passage and stairway, and two, 6x8 feet, for the balanced skips. The part of this shaft that is above the ground is entirely enclosed, and is a part of the mill building, entering the building at the ground level.

The most approved methods are employed in the mine to secure safe and efficient operation. The main haulageway extends back about one mile. It is carried 6 feet high and is wide enough to admit of using the 2 feet of barren rock taken from below the gypsum bed for a supporting wall on either side. The rooms are driven 24 feet wide by 300 feet long, and have a height equal to the thickness of the vein, which is about 4 feet, running in some places to 3½. Pillars 24 feet wide and alternating 40 or 60 feet long, are left, each being supported by a 20 foot crosscut.

Drilling at the places is done by Scranton electric rock drills, which are kept operating continuously during the day time while the men are loading cars close by. The holes are loaded and shot at night, bringing down sufficient material for the next day's operation. Large stones are sledged or broken by Ingersoll-Rand jack-hammers supplied with air from Ingersoll-Rand air compressors, mounted on mine car trucks and connected to the electric line used for lighting the mine and operating the trolley haulage system. This portable compressor outfit is a very convenient piece of equipment around the mine. It may be brought to any place it is needed without delay, and furnishes a steady and reliable supply of air for the satisfactory operation of the hammers.

The stone is thus, whether by blasting, sledging, or use of air hammers, reduced to one-man size, and of proper weight and dimensions to be put into

Crushing Plant of American Gypsum Co., from Mine Side

the mine cars by the workmen. These men work on a contract basis, as do the loaders in all the other New York gypsum operations.

The material is loaded into low built mine cars of two tons capacity each. These cars when loaded are brought to the main haulageway where they are made up into trains and picked up by either one of the company's two 5-ton Goodman locomotives. These locomotives, which operate from a trolley, take care of all the work of moving gypsum toward the shaft.

When the trains of loaded mine cars reach the shaft they are dumped by machinery installed by the Car Dumping and Equipment Company. This equipment discharges the stone into skips of 2 tons each, handling this work with dispatch and permitting speedy hauling back of empty mine cars.

Loaded skips are hauled up the vertical shaft by a 2-drum hoist made by the Buffalo Hoist & Derrick Company, and located in the mill building near the head of the shaft. Brought to the top of this shaft the skips are automatically dumped, each skip as it comes along raising the gate on its side of the shaft and dumping the load of gypsum rock at the primary breaking machine.

This primary breaker is a Jeffrey hammer mill which, after reducing the stone, passes it to a shaking screen that separates the material at 1½ inches and ⅝ inch and scalps out the oversize for return to the crusher.

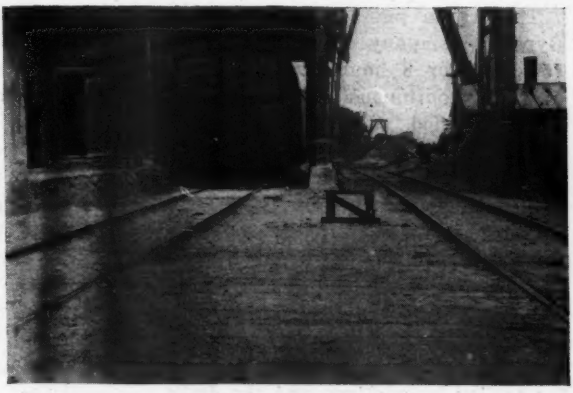
The dust arising from the grinding is disposed of by a blower made by the Buffalo Forge Company, which discharges into a dust collecting system where dust and air are separated.

When storage bins are filled with stone the material reduced by the crusher is taken off by a screen conveyor located below the shaking screen and passed to a storage pile across the loading track from the plant. Reclaiming here is handled by

a steam derrick with one large clamshell bucket. A Sauerman LeClaire scraper is used for bringing material within the area in which the derrick operates. With this equipment cars are loaded quickly.

When it is necessary to load box cars from the bins in the mill building, the work is handled by 2 Fairmont car loaders, which are run into the center of the car and extend out to the open side door. At this door end of the loader the device is supplied with gypsum which is conveyed to the other end of the loader and thrown sideways through the air to either end of the car, which it soon fills up as far out as the doors.

Loaded cars are drawn over a Fairbanks track scale where they are weighed before being picked up for hauling to the main line. The plant is served by the West Shore Line of the New York Central, which has along its right of way a number of gypsum plants. Among these is the Phoenix Gypsum Company, Wheatville, N. Y., which is under the same management as the American Gypsum Company. The spur track to the West Shore Line is about one mile long.



Cars, Loaded from Bins or Stock Pile, Are Weighed on a Fairbanks Track Scale

Sauerman-LeClaire Scraper Used on Stock Pile

Transformer Building and Storage House

The Akron plant of the American Gypsum Company has a capacity of 750 tons for 8 hours' operation, and averages continuously about 600 tons for that period. Material is all sold in crude form, principally to cement mills, some of it for calcination and later making into plaster.

The plant is electrically operated throughout on current from Niagara Falls, which is received at 11,000 volts and transformed into 440 volts. An amount is regenerated and supplied as direct current for use in the mine by the trolley locomotives and the drills.

Provision is made for fighting fires by the installation of a Gould pump driven by a 50 H.P. motor. This pump is connected direct to the waste water line from the mine, and is capable of supplying a continuous stream that would permit the easy conquest of any fire that might break out around the mill or shaft.

The mine is drained by 3 Gould centrifugal pumps, all discharging in the same waste water line. This waste water is disposed of at ground level by taking advantage of the natural lay of the land, which permits its being quickly run off.

The American Gypsum Company maintains offices in Rochester, N. Y., where the president of the company, Mr. Harry C. Nobles, has his headquarters. The plant at Akron is under the charge of Mr. L. E. Chamberlain, superintendent, who also supervises the operations at Wheatville, N. Y., where the Phoenix Gypsum Company is located.

Keeping Quarry Floors Clean

A CLEAN quarry floor is an asset. Besides, a floor covered with blasted rock is an ugly sight, and a reflection on the management.

Today with many machines that must be used in a quarry, it being necessary to move these heavy machines over the floor from time to time, a floor all littered up with blasted rock and other materials and piles of stripping debris, is a detriment to economical operation.

The writer has seen quarries in such bad shape that it has taken a large crew of men considerable time to move rock just to lay a new track, and much of this rock had been rehandled several times for the same purpose.

If for no other reason than for track laying and hauling with vehicles and moving machines over the floor, it should be kept clean, not only of loosened material but also of hard, uneven bottom.

Ridges and lumps are frequently left by blasts so that although there may be little loose material on the floor, yet it is rough and in bad shape for any use. A floor should not only be clean, but also smooth and kept in such shape as to drain easily.

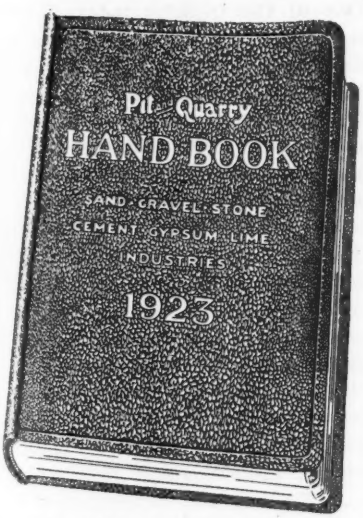
With loose material scattered all over the floor, it means the waste of much money. All such material has been stripped and blasted, and this may mean quite an investment.

In one large quarry visited a few years ago the writer was called upon to estimate the loss of money due to the floors being littered with rock, and found that at the current prices then being paid for rock, there was on the floor at least seven thousand dollars worth of material. It was not possible to tell just what sum of money had been spent to throw this rock down, but if it had been picked up and crushed it would have sold for seven thousand dollars. This would have meant a nice addition to the operator's income for that year.

Thus it can be seen that a floor all littered up with rock is not only a detriment in operating, but it means that the operator has much money tied up in the material on the floor. Surely it is worth while to get the use of the money so held up.

They Like Our Hand Book Idea

A month ago we mailed out with PIT AND QUARRY an announcement of the early publication of a hand book covering the industries represented by this journal. While we have been at work on this book for some time, this was the first news of it given out to the trade, and the results have been more than gratifying. Not only are producers in large numbers filling out the card which asks to be put on the mailing list for the book, but the immediate demand for catalogue space, by manufacturers and others supply-



ing this field, has been remarkably encouraging, showing unmistakably the need for such a book in the pit and quarry industries.

It is intended that the book shall cover the following:

STANDARD PRACTICE
A treatise outlining the standard methods of operation in each of the industries covered.

STATISTICS
Showing production, distribution, use, average price, etc., of pit and quarry products.

MAPS
Showing distribution of materials and location of plants.

CHRONICLE OF EVENTS
Record by months of the principal happenings of the past year in the pit and quarry industries.

ASSOCIATION DIRECTORY
Giving name, location and officers of the various trade organizations in these industries.

WEIGHT AND BULK OF MATERIALS
Tables showing weights per cubic yard, and yardage per ton; also angles of repose, and other constant factors.

FREIGHT RATES AND TRAFFIC REGULATIONS
Including Loading, Demurrage, Switching Charges, etc., in the several freight territories.

HIGHWAY SPECIFICATIONS
Digest of such specifications so far as they relate to mineral aggregates.

INSURANCE RATES
A digest of rates on fire and marine insurance.

LIABILITY INSURANCE RATES AND TERMS
Rules in force in the principal producing states.

EXPLOSIVES
Rules regarding transportation and storage.

KINKS
A "how to do it" department, giving methods which many producers have found effective.

SAFETY
Principal provisions of codes which have been recommended or adopted.

FIRST AID
Giving means of rendering quick assistance to wounded men.

GLOSSARY OF TERMS
A full glossary of words whose chief application is in the pit and quarry field.

CATALOGUE
This section will represent the leading manufacturers of machinery and equipment, and will be so classified as to be readily accessible. An alphabetical index to this section will also be provided.

LIST OF TRADE NAMES
Arranged alphabetically so that the manufacturer of any branded equipment can readily be traced.

Those who have not already made application for the book should do so at once, so that a sufficient number can be printed to meet the need. Make application on the post card accompanying this issue.

Addenda

In the October issue of Pit and Quarry we neglected to state, as part of the story on the American Cement Plaster Company, Akron, New York, that the trolley locomotive used in the mine was made by the Goodman Mfg. Co., of Chicago, Illinois. The Goodman locomotive used in this mine has been giving very satisfactory service ever since it was first installed. It encounters some stiff grades, pulls trains of cars that are quite a bit above its rated capacity and operates continuously through the 8-hour mining period.

Institutional Management for Business

The Fifth of a Series of Articles

"WHERE do you house your men?" asked a visitor of a quarry superintendent. "Down at the foot of the mountain in those box car bodies," replied the superintendent pointing in that direction.

There were four bodies of some old box cars, unpainted and patched up so as to convert them into homes for men. From six to eight men were living in each old car.

Homes! They could hardly be called that, yet the men were compelled to live there or else seek jobs elsewhere. Little wonder that many of them did and that it was difficult to hold men in this quarry.

One would not have been surprised to have found such conditions in a small quarry operated by an individual with little money or capital; but the quarry in question was one of a company operating a number of large crushed stone quarries.

This example may be an extreme case, and it is cited for that reason; yet it is true that many quarry operators pay but scant attention to how their workmen are housed, and in a large number of cases, when it is necessary for pit and quarry owners to have buildings to take care of their men, that very cheap and uncomfortable houses are built and little attention is paid to sanitation.

What is the result? The best men go elsewhere to obtain employment, where they can have a comfortable house. Into a squalid camp or village few men will bring their families, so that those who seek employment are generally floaters—here today and at another place on the morrow. The result is that indifferent work is done and the operator is generally short handed, and has continual labor troubles.

If men are to consider a business organization such as a stone quarry or a sand or gravel pit an institution for which they can work for a long term of years and possibly for a lifetime, there must be a common interest between the employer and employee that must reach more than through their work and even the pay envelope, into the workmen's homes. This is always possible even if the employer does not furnish the homes to his workmen, and is much more so when the employer furnishes the home.

One of the troubles today that exists in the coal mining field is that the operators have been indifferent to the interests of the miner and there has been little if any influence exerted by the employers in the homes of the miners. Where there has been you will find better satisfied workmen. A squalid home is not apt to engender any kindly feeling towards others and especially towards those who are held directly responsible for the conditions that exist.

It has already been stated in this series of articles that "it is an employer's duty to see that his employees can spend their money properly and that they get value received for their dollars." This applies to house rent just as much as purchasing food and clothing. Thus if an operator's workmen rent houses from others, the employer should be interested to such an extent as to see that the rent is a fair one and the conditions of the houses are the best obtainable in that locality for the money.

A landlord may be unwilling to do much for the ordinary tenant, but for an employer of a large number of renters he is bound to take a different attitude, for he knows such a man can give him renters when they are difficult to obtain, and if he fails to treat

tenants properly that he will lose them when it is possible for their employer to get other houses for them. An employer who will look after such things will be building an institution of his business and for his men, although he may not realize it. The employer may not have time to look after such things personally, but a clerk, timekeeper, or paymaster may be delegated to do these things, the employer only giving supervision and his personal attention when absolutely necessary.

If it is possible to better the conditions under which workmen must live when they are renting from others, it is certainly the duty of an employer to see to it that his workmen are housed properly when he himself is the landlord. Then the entire responsibility rests upon the operator and he cannot shirk it if he is to make his business such an institution as his employees will rally to and so cooperate as not only to make the business pay, but to grow from year to year.

It should be evident to any employer that to house men in an old box car is not inviting men to work for him. Nor to build rough wooden shacks, or house his men in an old barn, is not good advertising in the labor market. These may be temporary expedients in starting business that men will overlook, but to continue their use is a great mistake.

Expensive houses need not be built; but well planned, comfortable houses that can be stained or painted should be erected. A porch not only adds to the appearance of a house but much to the comfort of the occupant.

Plenty of light should be furnished, and besides good ventilation the houses should be arranged so that they can be easily and cheaply heated.

Running water can often be put into such houses without great cost, for in many cases pumps must be operated to unwater pits and quarries, pumping both day and night; and although this water may be unfit for drinking purposes, yet it may be used for all other things. This may even admit of bathtubs being placed in the homes of the workmen.

Such homes as these may be built for little more than the sordid shacks frequently seen, and no self-respecting workman would hesitate to take his wife and family into such a house.

Each house should have a plot of ground around it that should belong to the renter. This can be used to raise vegetables and also for some flowers and possibly a grass plot. A few shade trees would add to the beauty and comfort of the village.

If the operator keeps his property clean it will act as an incentive to his workmen to follow his example. In fact it is possible to arouse friendly competition among the tenants to keep their places clean and beautify them. Prizes can be offered for the best kept lawn, raising the greatest variety and prettiest flowers and also the best vegetables.

Twenty-five dollars spent in such a contest would do much to create an interest in the men's homes, and the awarding of these prizes in the autumn would furnish the occasion of a social among the tenants to be held at the recreation center.

Streets with paths and roadways can readily be built and kept in good order with the refuse from the quarry or gravel pit.

The fact is that if an operator shows an interest in these things that many of the best workmen are always willing to spend some of their own time and money to make other improvements around their houses.

It is to this class of men that the employer wishes to appeal. Such men take an interest in their work and will stay with the same employer for years. In the home building the woman must be considered. A man's wife will hold a man much longer on a job than he

may care to stay himself. The woman is the real home builder. Her instincts are along this line. She not only wants a place neat, but with some touches of beauty about the premises. More educational work to hold men on their jobs can and should be done among workmen's wives than with the men. The women can prevent strikes. They will keep the men satisfied if they themselves are satisfied.

Most employers have overlooked these facts. See that the women understand a new method of paying, or arrangements for educating her children, and she will see to it that her husband and sons are in favor of such things. Make the recreation center hers as well as the men's and the center will be used to the best advantage and be a co-operative influence for good for both employer and employees.

Arrangements must be made to send the children of workmen to school. If a school house is not within walking distance then a conveyance of some kind should be provided. In many states if an employer arranges for such a conveyance the cost of operating it will be borne by either the state, county, or town, thus relieving the operator.

The cost of all these things can be included in the rental charged, provided the employer is satisfied to earn only a fair interest on the money invested. If he is looking for a large profit, the workmen will not stand for it. If an employer wishes to build an institution to which his men will prove loyal he must be loyal to his workmen and show them by both word and deed that he has their welfare at heart.

In considering homes for men, those must be considered who have no families or are separated from their families. This means at least one house built and arranged for a boarding house. It is a mistake to try to convert an ordinary dwelling into a fair sized boarding house.

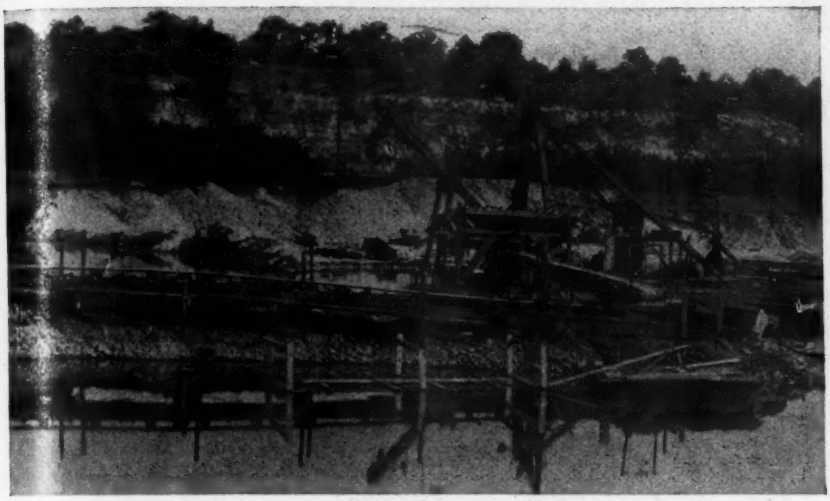
The men must be housed and fed well and this is a part of the duty of the employer as outlined in a former article on Institutional Management. In the same article recreation centers were also discussed.

Where men must be housed in pit and quarry operations there is no reason why there should not be a real village built, with the company store as a center. The recreation center can become more than a place of amusement and pleasure, for it can be used as a school during the day and on Sunday as a place to hold religious worship.

Fluorspar Investigations

The importance of fluorspar in the steel and ceramic industries is so great, and accurate information on methods of mining, milling, and utilization, and on costs of production and possibilities of future production is so lacking, that it has been considered advisable by the Bureau of Mines to investigate all phases of the fluorspar industry in the United States. At the request of, and in company with several eastern fluorspar producers, examination has been made of the principal fluorspar deposits of the western states. This examination was followed by an intensive study of the producing mines in Illinois and Kentucky. It was found that most of the deposits in the far western states were small and could not be relied on to produce much surplus over the needs of the western states. Costs of production in the Illinois-Kentucky field have increased greatly, owing to the increasing depth of the principal mines, the large amount of water that must be pumped, and the increased costs of labor and supplies. A report on all phases of the fluorspar industry is in preparation.

The Concord Lime Co., of Knox County, Tenn., has been incorporated with a capital of $10,000. Incorporators: H. G. Winfrey, M. L. Winfrey, O. L. White, C. H Winfrey and Ruth E. Winfrey.



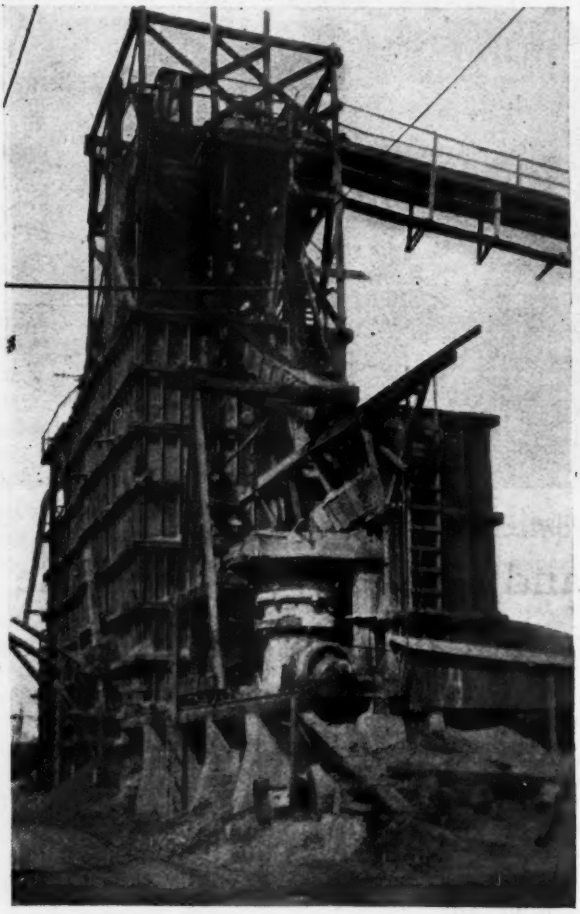
Handling Material by Belt Conveyors

Excavate Sand and Gravel Along the Ancient Illini Trail

THE plant of the Moline Consumers Company near Ottawa, Illinois, has been in operation for some five or six years, producing sand and gravel for markets located mostly to the west. The method of operating involves excavation by a dipper dredge, conveying over considerable distance to the plant, and washing, screening and crushing at the plant.

The material that the plant is producing comes from a deposit that has a quite high proportion of large material, some of it tightly cemented. The material is strong and passes highway tests very well. It is covered by a light overburden which is worked back from the gravel face by a crane equipped with a scraper bucket. The age of the material is questionable, but it probably does not belong to the early Wisconsin Age, which outcrops in numerous places along the bluffs of the Illinois River. Deposits of this early Wisconsin gravel are found near Utica, LaSalle, Spring Valley and between Depue and Bureau, and south of Bureau on the west bluff of the Illinois, all of which are thought to have originated with the ice advance of the early Wisconsin stage. The material in the deposit in question is very likely later Wisconsin gravel which in the main is that found within the valleys and is of two sorts—that under the terraces and that which forms part of the valley filling. The material under the terraces is thought to be of glacial origin at least in part, and to have been formed when the ice edge was not far to the east of this region. The gravel forming part of the valley filling is possibly of more recent origin, having been deposited after the Illinois valley ceased to be the outlet of glacial Lake Chicago.

The pit from which the gravel is being taken is assured at all times of a steady supply of water by seepage



Two No. 5 Allis-Chalmers Gyratory Crushers Are Used

from the Illinois and Michigan Canal, which is located within a stone's throw of the pit. Were the material of suitable character for pumping, this water supply would give a splendid opportunity to use pumping methods to advantage. But the other requisites for a successful pumping operation are not present at this deposit, and their absence illustrates how seldom the average producer enjoys all the natural requisites for one form of excavation or another. He may have fine material and not enough water or plenty of water and material that is too tightly cemented or has too many boulders. At the Moline plant there is plenty of water for pumping, but the material is too hard. Parts of it, in fact, give the dipper dredge just about all the work that it can handle.

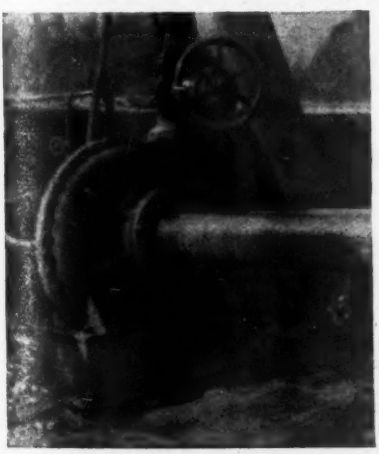
This dipper dredge is a piece of equipment of the Company's own manufacture. A scow was built at the plant and on it was mounted an American Hoist & Derrick Company's derrick and a Thomas hoist. A ⅝-yard bucket is used and power furnished by electric motor.

The material excavated by this dredge is dropped into a hopper mounted on a scow that is kept at all times lashed alongside the dredge. At the upper part of this hopper is a bar grizzly spaced 8 inches. This grizzly is quite an essential part of the equipment, for a considerable amount of oversize material is knocked off at this point. The hopper operates without automatic feeder, discharging upon a belt conveyor running direct to another belt conveyor, the end of which rests on a small strip of land. The length of the conveyor running from the hopper to this second conveyor is adjustable and can be arranged to reach out in all directions from the strip of land on which the stationary conveyor terminates. In this way, operations can be extended in all directions with a minimum of alterations. When it is desired to

start the dredge digging at any point, it is necessary only to draw it over, anchor it by the spuds and then swing the hopper alongside. This movable belt conveyor is 24 inches wide and at the present time 50 feet in length. The length of this conveyor may be changed at any time to conform to digging requirements. A good illustration of the manner in which this floating conveyor is used to work the deposit out in the form of a horseshoe around the end of the first stationary conveyor is given in one of the accompanying pictures, which shows also the Illinois and Michigan Canal in the background.

Screening, Washing and Crushing Plant

The first stationary belt conveyor is 225 feet between centers, and is equipped with a 24-inch belt. This belt discharges to a small hopper from which another belt conveyor running direct to the plant takes off its supply of material at the bottom. The first conveyor raises the material a few feet in height during its trip from one end of the belt to the other. The structure on which this first field conveyor is built is of piles driven into the gravel at the bottom of the pit. In this regard it differs from most field conveyors in use around gravel pits. Usually the field conveyor is made to run around the edge of the pit. The structure supporting the field conveyor also serves the purpose of a support for the electric feed lines running out to the dipper dredge and the floating conveyor.



Morris 6-inch Pump

After the gravel has dropped from the hopper below the field conveyor, it is taken up by a 24-inch belt conveyor, 457 feet between centers and operating at an angle of 10 degrees. Under this big conveyor, rollers are set 4 feet apart. Few idlers are used, the belt holding itself well in position over its entire length, by the loaded trough. Alongside of this long conveyor is a walkway extending from the top of

the plant to the ground level.

The long plant conveyor belt discharges at a hopper in which the gravel meets a stream of water by which it is washed and flushed down to a series of 4 Dull screens 53x82x30 inches. With these screens are produced three sizes of gravel and one of sand.

Oversize that is thrown out by the screens drops to a grizzly, which separates this material into 2 lots. Of these two lots the larger oversize goes to a No. 5 Allis-Chalmers gyratory crusher, and the smaller oversize to another Allis-Chalmers machine of the same size. This arrangement of crushers is found very convenient when it is necessary to repair one or another of the machines. At such times the plant runs ahead without interruption, one crusher temporarily doing more work than usual.

The crushed gravel as it drops out at the bottoms of the crushers is fed by chutes to a belt conveyor 20 inches wide and 165 feet between centers, which carries the crushed product to the large 24-inch plant conveyor belt that brings the material to the plant in the first place. This crushed gravel conveyor is powered by an electric motor at the head pulley. It feeds the plant conveyor belt through a chute which spouts the material in the center of the trough as illustrated in one of the photographs.

After the material passes the screens it goes to storage bins of 350 tons capacity each. The material is drawn off from these bins at the side through Dull bin gates. Loading is done directly to Rock Island cars or to cars of the electric interurban line which runs by the plant and has at the plant a flag station known as Gravel.

Sand is washed and separated by Dull settling tanks, and is then passed on to sand storage bins. The amount of sand obtained at this plant does not run nearly as high as in most plants in the Middle West.

Water for the washing operations is furnished by a 6-inch Morris centrifugal pump, belted to an electric motor. The water is taken up at the corner of the pit close by the plant, and, after use in the screens, is run off in flumes to a settling basin from which, when clarified by settling, it flows back into the pit.

Individual electric drives are used throughout the plant. General Electric motors are used exclusively together with starting equipment furnished by the General Electric Company. Central station power is brought in at 33,000 volts and transformed to 220 volts.

To insure good light when the plant is running at night, "flat cone" reflectors made by the Benjamin Electric Company of Chicago, are located in a number of positions. These reflectors are placed above the screens and crushers, and at the points where the field conveyor and the crushed gravel conveyor discharge onto the long plant conveyor belt. They are also used in a number of places on the dredge.

This plant was designed by Raymond Dull, and contains considerable machinery developed by him and made by the Weller Mfg. Co., of Chicago.

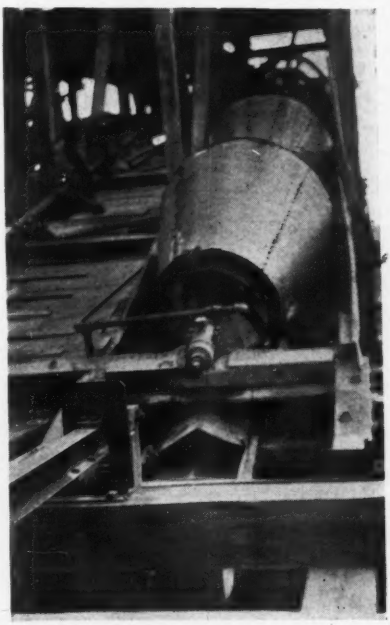
The operation of the plant is superintended by Mr. Oscar Johnson, a sand and gravel man of long experience.

The Syracuse Sand Company has been incorporated at Syracuse, N. Y.

The first carload of gypsum mined by the Imperial Gypsum Co., San Diego, Calif., was shipped in September to a Los Angeles firm. This company was organized two years ago, and has built a 25-mile railroad from the San Diego highway to the company's mines, where immense deposits of gypsum are located. The company has established a mill at Maria, Calif., and the gypsum is hauled down the railroad to the mill, where it is crushed and loaded on cars for shipment.

General View of Plant of Moline Consumers Co., Showing Dipper Dredge in Foreground

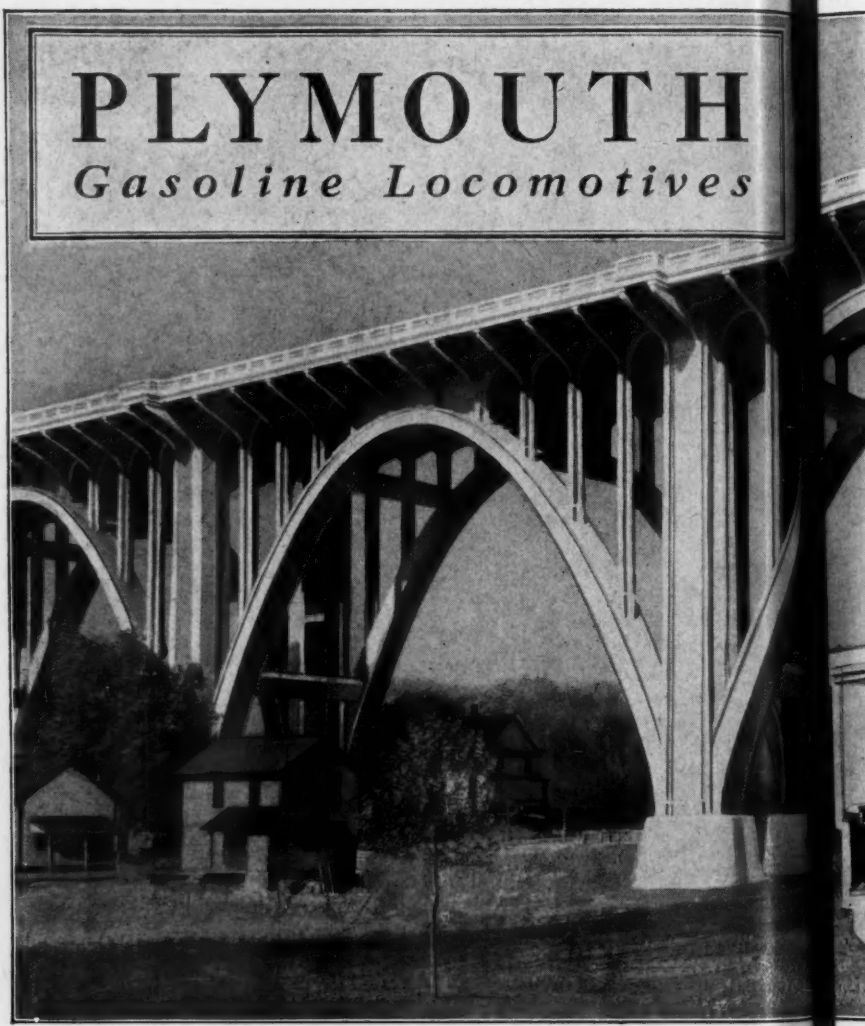
Looking Down Plant Conveyor. Crushed Stone Belt Discharge Part Way Down



Part of the Dull Screening System

Dipper Dredge and Field Conveying System. Illinois and Michigan Canal in Background

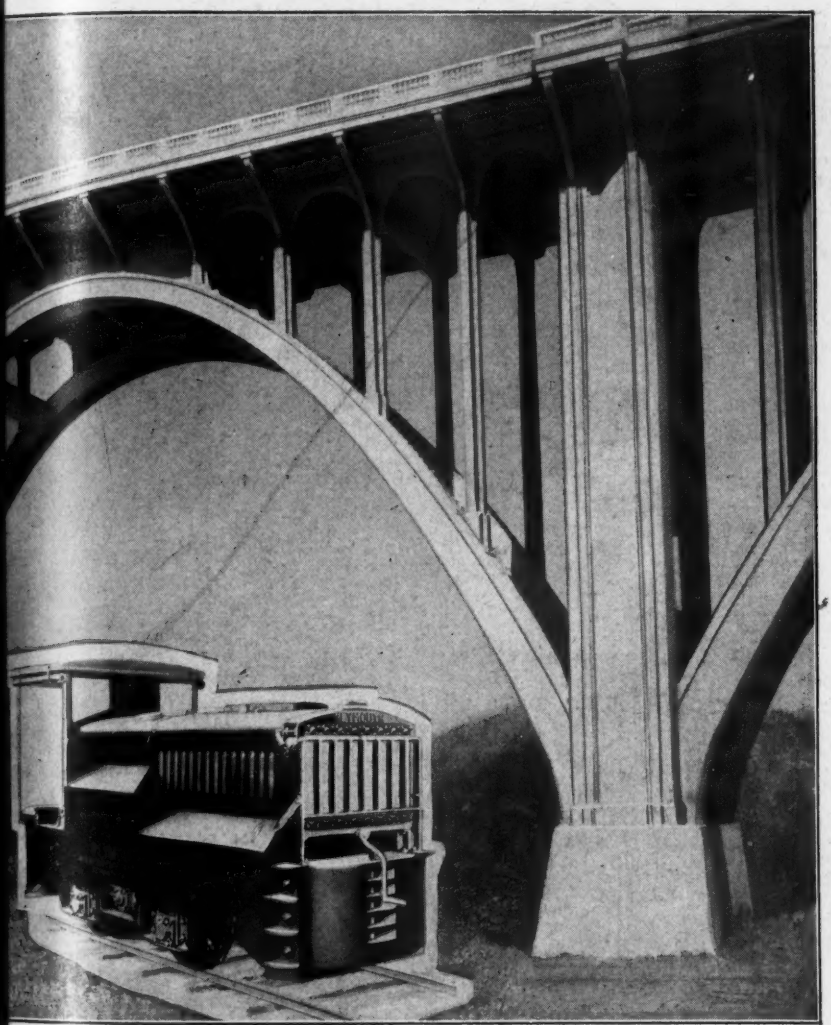
PLYMOUTH
Gasoline Locomotives



North Hill Viaduct, Akron, Ohio, Constructed by James O. H[illegible]eer

James O. Heyworth, Engineer and Contractor, Chicago, completed in August, the above viaduct of which the following data indicates its magnitude:

DATA—North Hill Viaduct, Akron, Ohio. Work begun June, 1919. Completed August, 1922. Total length, 2,810 feet. Maximum height, 135 feet. Number of spans, 16. Two concrete approaches—North, 148 feet; South, 167 feet. Arch spans vary, 116 feet to 191 feet. Concrete used, 57,000 cu. yds. Reinforcing bars, 2,500 tons. Width of deck, 72 feet. Ten-foot sidewalk each side. Roadway between curbs, 52 feet. Double track in center for street railway traffic.



eer and General Contractor. For Magnitude See Data Below.

Mr. Heyworth writes: "All concrete in job, except small amount going direct into forms, was handled from mixing plant to structure by three 3-ton PLYMOUTH Locomotives. Service given was very satisfactory."

That's glory enough. Ask us for literature.

THE FATE-ROOT-HEATH CO., Plymouth, Ohio

Grinding and Calcining Plant From Top of Crusher House

Trestle Between Mine and Mill. Adit in Background

Mixing and Calcining Buildings from B. R. & P. Tracks

Cars are Dumped at Crusher on Rocking Tipple Operated by Lever in Foreground

Complete Gypsum Mining and Milling Operation

THE gypsum deposits of western New York, which occur in the Salina formation of the Silurian system, form a continuous belt of material from the Niagara River to Syracuse, maintaining an average width of 7 to 10 miles. The Salina formation includes also the rock salt belts of the state, these occurring about the middle of the section, most notably at the town of LeRoy.

In this extensive area are a number of grades of gypsum, ranging through various degrees of hardness, and permitting the manufacture of a number of qualities of plaster.

The first or top number of the Salina formation is the Bertie limestone, a more or less magnesian stone of quite uniform character, extending from the province of Ontario, where the type locality is found, eastward as far as Schoharie county. It serves as a very useful surface indicator of the presence of gypsum, for the main gypsum beds are not far below it in the shales. Underneath the Bertie limestone occurs the Camillus shale, including a considerable thickness of soft shale containing intercalated layers of magnesian limestone. The workable gypsum beds are found in this shale at different horizons, many near the top. The color of the shales is commonly drab or grey, but varies to olive green and in some places to red. The thickness of the shale, together with the gypsum beds, averages perhaps 300 feet in the central part of the state. The gypsum deposits are divided into separate beds by seams of shale, although there is no regularity in the number of thickness of the beds. The gypsum is usually found near the top of the Camillus shale.

Not far from the center of this interesting formation, are located the mine and mill of the Empire Gypsum Company, Inc., situated southeast of Garbutt Station on the B. R. & P. and Pennsylvania railroads. The gypsum here averages about 6 to 8 feet in thickness, the middle two feet of which appear to be the best quality and the lower two feet considerably harder. A good limestone roof runs over the workings, which are underlain by 10 feet of limestone. Underneath this limestone foundation is a second bed of gypsum which the company has not yet developed, but which may at some time be reached from a lower level. It is calculated that the mine can furnish gypsum for the next 80 years.

The main tunnel runs back about 1¼ miles from the mine at an average depth of about 60 feet. At the present time the company is working 10 places, and employing about 30 men at drill running and car loading. The mine is one of the roomiest in the western New York district, the tunnels never running less than 5 feet and in some places going up to 9, with the average height before mentioned of 6 to 8 feet. It is comparatively quite a dry working, and the matter of drainage does not present any particular problem. The work of drainage is handled by a Gould pump with a second Gould 4-inch centrifugal pump for boosting to ground level.

The method of securing the gypsum is quite the same as that employed in the other New York mines. Drill runners are kept working continuously with Scranton rock drills, one at each face, boring a 1½-inch horizontal hole about 8 or 9 feet in length. These holes are loaded with dynamite and shot each night, after the men loading

"Tramp" Iron Removed by a Dings Magnetic Pulley

cars have quit. This method brings down a considerable part of the stone in one-man size. Occasional large stones are reduced by sledging or by the use of air hammers operated from compressors mounted on mine car trucks and powered by electric motors connected to the same direct current electric line which feeds the motors of the Scranton drills. With these methods the company is able to accomplish daily the loading of as many as 200 mine cars of 2½ tons capacity each.

As cars are loaded at the places, they are picked up by a Mancha Mule. This battery locomotive haulage is used only for this work. As the locomotive hauls away the loaded cars, it drops empties for filling, drawing the full cars to the main tunnel and up to a point about a mile back from the entrance of the mine where a trolley system begins.

Loaded mine cars are made up into trains of about 15 cars each, and hauled to the mill by a 4½-ton General Electric locomotive.

The trolley locomotive pulls its train as far as the trestle shown in one of the photographs, just outside the entrance to the mine. From this point on the work may be said to have been transferred from the mining to the milling department.

The cars are pulled up to a tipple by a cable running from a single drum hoist made by the Buffalo Hoist and Derrick Co. The operation of this hoist is in charge of a man who also acts as scaleman, weighing each car as it comes along on a Howe track scale, and taking off car loaders' checks.

Cars are of the end-dumping type and are made to discharge on a rocking tipple by a chain and hoist operated by a lever. As the cars dump they are allowed to run out on the trestle, where they are sent by a spring switch to a track beside the one on which the loaded cars are standing. As the empty car runs out on the trestle, it carries the cable to a point where it is hooked to one of the loaded cars. On the return track empty cars are made up into trains and are picked up by the trolley locomotive and returned to the mines for reloading.

At the tipple stone is dropped from above to a No. 14 Traylor gyratory crusher, located below grade so that it is unnecessary to raise the stone from the level of the trestle between the mill and the mine entrance. Because of the necessity of reducing the stone to fairly small size for loading, most of it enters the crusher without bridging, and the primary breaking operation is therefore quite an easy one. This primary crusher discharges at the boot of a vertical chain bucket elevator with buckets 18 inches wide. This elevator, which is 50 feet between centers, raises the stone to a point 5 feet above a belt conveyor running to the grinding and calcining plant. The material drops by chute to this conveyor which is 14 inches wide and 200

feet between centers. This conveyor belt runs in an enclosed gallery.

The primary crusher and the vertical chain bucket elevator are driven by a General Electric motor through a line shaft; that is to say, an extension of the crusher shaft constitutes a line shaft from which the elevator is driven by chain through beveled gears. The belt conveyor is powered at the tail pulley by a General Electric Motor.

Butterworth & Lowe "Cracker" Reduces Stone to Right Size for Rotary Dryers

At the discharge end of this conveyor belt is a Dings magnetic pulley. This device performs the office of a protector of the machinery that is used in later parts of the process. It takes out all tramp iron that may get into the rock down in the mine, or during the time that it is in the cars. Inspection of a pile of metallic refuse underneath the conveyor shows railroad spikes, nails, broken bits of castings and tools that if not removed might work serious harm to the grinding machinery.

The belt conveyor carrying the stone from the primary crusher after it passes the magnetic pulley, discharges over a woven wire screen, with 1½-inch openings, set at an angle of 45 degrees. The material that goes through it passes direct to the dryers, and the stone that is rejected drops to a Butterworth & Lowe "cracker." The product of the cracker follows the same course as the fines from the wire screen, going by elevator and conveyor to the dryers.

In the dryers, which are 30 feet long and 5 feet in diameter, made by the Ruggles-Coles Engineering Co. of New York City, there is removed all natural moisture of the stone that is acquired in the mine and any increased moisture that it may have gained in exposed positions as it goes to the mill.

The work of processing gypsum rock is next taken up by three Raymond mills, which receive the stone from the dryers and reduce it to the degree of fineness desirable for calcination. The material as it comes from the Raymond mills is elevated by blowers and passed to bins from which the kettles are fed.

Three kettles, made by the Des Moines Manufacturing and Supply Co., take care of the work of calcination. A fourth kettle has just been added. It was not yet in operation at the time the accompanying photographs were taken and the smokestack which serves it was just being hoisted into place. It has since been put in service and is now working with the other kettles. This kettle has a stack of its own, while the other three kettles are served by one large stack.

After calcination, the gypsum is dropped at the back of the kettles to the level of the kettle firing floor, into a long trough running parallel with the battery of kettles, in which trough is a screw conveyor. This screw conveyor carries gypsum to a vertical elevator which passes on to another screw conveyor. This last serves the mixing plant through a gallery con-

necting the two buildings and housing also a communicating walkway.

In the mixing plant gypsum is passed by systems of chutes and screw conveyors to the mixer bins and to the board and block plants. The material intended for mixing with fibre and retarder is spouted into large conical hoppers above the mixers. These hoppers are designed to operate in conjunction with a Howe scale. Gypsum is thus weighed out accurately into batches, and the exact amount of retarder necessary for the particular batch being made is here added. The wood fibre or hair is also put in at this point. The wood fibre used is mostly poplar and basswood obtained from around the plant and shredded to the necessary fineness by the company's own machines. The stucco, with the retarder and fibre are passed down to the lower half of a Broughton mixer, in which they are thoroughly worked together. The product is then taken off in wire-tied cloth bags.

The plain stucco without hair, fibre or retarder may be drawn off from one of the bins in the mixer building. Provision is also made at an earlier part of the process to draw off ground raw gypsum for use as land plaster.

Adjoining the mixing plant of the Empire Gypsum Company, Inc., is a block plant belonging to the Ebsary Gypsum Company, which operates on gypsum taken over by a screw conveyor, after it has passed through an automatic scale made by the Richardson Company of New York City. This scale weighs out the gypsum as it comes along and passes it on in batches to a screw conveyor running to the block plant. It also records the amount of material that is passed through it and thus furnishes a convenient and reliable means of determining just what amount of material has changed hands. A Richardson automatic scale is also provided to keep track of the amount of gypsum supplied to the board plant of the Empire Gypsum Co., which also adjoins the mixing plant.

The board plant of the Empire Gypsum Company in which is manufactured a considerable quantity of wall board, is a model of order and cleanliness. Construction work on this board plant is not quite complete, although operations are carried on without the additional equipment that is being put in at the present time. This new machinery will add a number of refinements to the methods of making wall board.

The plant of the Empire Gypsum Company is electrically operated throughout, the only place where coal is used being in the kettles. General Electric motors and controllers are used pretty generally, throughout and square D safety switches are installed in all places where the operation of an open switch would be in any way hazardous.

In connection with the plant is a machine shop for handling a large part of the repairs that continuous operation makes necessary. Here also the rock drills are kept sharpened. This in itself involves no small amount of work, for efficient work by the drill runners requires, among other things, that the equipment that is used be always in good condition.

The main office of the Empire Gypsum Company, Inc., is in Rochester, N. Y. Here Mr. Augustus A. Wolf, president of the company, maintains his offices, as does also Mr. Theodore W. Curtis, sales manager. The plant at Garbutt is in charge of a superintendent, Mr. C. M. Diffenderfer, assited by Mr. Frank Shaefer. The company has high standing in the gypsum district of Western New York, and supplies local markets with a large amount of finished gypsum products.

Is Your Dredging Modern?

IN NEARLY all of our larger rivers, near their mouths, and in our harbors and bays and likewise in many inland lakes, deposits of sand and gravel can be found. As these sources of supply are in most cases near our larger towns and cities, or else cheap water transportation is available when the distance is great, a tremendous industry has been developed in reclaiming these building materials from our bodies of water and selling them in the cities.

Many of the dredging plants are not only costly, but well designed, and although there is bound to be a fairly heavy plant charge against the production, yet the cost of reclaiming the sand and gravel is small due to the cheapness of operation of these well designed plants. The fact is, that the dredging and production of gravel from streams has been so cheapened that in many localities the low price of gravel has made it difficult for other materials to compete.

Although there are many well designed dredging plants used to produce sand and gravel, yet it is quite surprising how many makeshift dredges or dredging plants are found in use. In most of such cases this not only means a curtailment of the production, but the cost is considerably increased.

In some cases such plants are continued in use due to lack of ready capital to replace them with modern economically operating machines, while in other cases it is due to a lack of knowledge on the part of the operator of modern pumps, dredges and excavating machines that are on the market.

It is a case of believing the plant that is being used is modern and of being satisfied. Thousands of dollars are lost yearly due to business men being satisfied with their profits.

In a business it should not be, "Is a profit being made," but rather, "*Is all the profit possible being made?*"

That should be the standard by which to judge a business. Satisfaction is better than dissatisfaction: but satisfaction has lost many an opportunity of making a fortune, and in some cases has caused a man to drop so far behind his competitors that he has been engulfed in the stream of failure, never realizing that his satisfaction has brought continued disaster until it was too late.

Today there is no need of a man lacking knowledge as to his business. There are too many trade papers that bring to the business man information and warning. Manufacturers give information through advertisements and catalogues. Expert services can be obtained for reasonable fees, so that no one need be dependent upon his own knowledge.

The basis of all dredging is either in pumps or excavating buckets and many manufacturers not only furnish information on such subjects in printing or writing, but likewise furnish engineering advice without cost to their customers and possible clients. Thus every operator can post himself to some extent as to whether or not he has a modern plant and one designed especially for the work he has to do.

Knowing such facts the operator is in a position to make such improvements, or to so rebuild his plant as not only to produce his products cheaper than his competitors, but to make all the profit possible; and that is why he is in business.

The Pensacola Gravel Company, Pensacola, Florida, has been incorporated with a capital of $3,000. Officers and directors: J. Y. Baillies, president; A. V. Freema, vice-president; R. Leon Jones, secretary and treasurer.

The Use of Big Blast Hole Drills

HERE is a large quarry having a modern crushing plant with a rated capacity of several thousand tons of crushed stone per day; and yet all the drills at work on the ledge are of the hammer type, some large and powerful enough to drill holes from 10 to 15 feet in depth. The high ledge is taken down in benches without any great regularity as to the location of the bench and the drill holes. Thus ladders must be used and men must climb over the face of the ledge carrying drills and explosives, a dangerous task for any one.

A second quarry, with a face to the ledge of about 100 feet, does all the drilling with tripod drills. Here again the task is similar to the quarry using the hammer drills with the same attending danger.

A third large quarry does most of its blasting by means of tunnels or gopher holes driven into the face of the ledge at the quarry floor.

In the writer's opinion each of these operators is making a serious mistake and one that is likely to add considerably to the cost of blasting by using one method exclusively in doing their drilling.

Hammer drills should be used in every quarry, for they are needed for many purposes and a quarry that does not possess among its equipment some of these drills, can hardly be classed as up to the times.

The same thing might be said of the tripod drills, as there are a number of uses for this type of drill in every quarry.

Gopher holes for blasting can likewise be recommended, but at times they are too expensive for the depth of the ledge and the tonnage they will throw down.

For great height of ledge and for heavy blasting the most economical method of drilling holes for large blasts is by means of big blast hole drills, formerly known as well drills. A comparison of the method of operation and the results obtained by these drills should give a lesson to all who are not using them.

A few words as to the history of these drills might be of interest and also show their adaptability.

Deep blasting was formerly done entirely by means of long churn drills by hand. The writer has driven holes by this method more than 70 feet deep. The alternative was to take the same depth in benches. Both were expensive and also slow. But the writer found it cheaper for a great depth when rock was to be moved with a steam shovel to drive the deep holes instead of benching the ledge.

The credit is given to a prominent contractor as being the premier in the use of a well driller for driving a deep blast hole. As the writer has the story, such a machine was first used for this purpose on this contractor's work, but against his will and desire, and he discharged the foreman for hiring a drill for this purpose until he learned that the machine had saved him considerable money, when he put the foreman back to work and bought a machine, following it with the purchase of many others. This incident called the attention of many people interested in deep rock drilling for blasting, to this method. The manufacturers of such machines soon found that the ordinary well drill had to be built stronger and adapted to this particular kind of work.

Within a few years of the incident related many contractors were using these drills, and this was followed by quarry-men and deep open mine operators adopting them.

At first the knowledge of their economic operation was meager and it was necessary to try them out for differing conditions.

One of the early ideas was that these machines were only practical and economical for very high breasts in quarries, while it has since been learned that the drills can be used down to such depth as has proven the limit of the largest sizes of tripod drills.

Much too has been learned as to the diameter of the holes drilled and regarding the spacing and loading. By them the drilling per cubic yard of rock blasted has been much reduced in cost, and in some cases a saving has been effected in the amount of explosive used, but it is not always possible to save explosives. Generally speaking a big blast hole drill will save enough in the blasting operations to pay at least 100 per cent annually on the money invested, while in many cases this will be materially increased.

For any fair depth of holes when benching rock and drilling with small drills, the holes are made of smaller diameter the deeper they go, hence excessive springing must be done to get a fair amount of explosive in the hole. On the other hand the big blast hole drill makes a large diameter hole the same size from top to bottom. With the wide diameter regular width of hole a greater amount of explosive can be placed not only at the bottom of the hole but also at any depth desired in the hole.

It is these facts that allow, when using a large machine, of greater spacing of holes. This alone would reduce the cost of drilling per cubic yard of rock blasted. Based upon the cubical contents of the two holes the larger hole will be found much cheaper to drill.

The cost of explosives for the large holes will be less than for the small hole, due to the fact that the yardage from each hole is much larger and also that the full force of the explosive may be expended on the rock

These things mean that the stone is brought down in better condition, which saves secondary blasting. With the small diameter hole much of the stone is likely to be thrown down in large sized boulders, so that the majority of the pieces of rock are even too large to be handled by a steam shovel. For hand and power loading this means much sledging must be done and a large amount of blast hole and adobe blasting made necessary.

In large quarries where fair sized shovels are used for picking up the rock and large primary crushers for breaking, extremely large blasts have been made, where the drilling was done with big blast hole drills, when less than 5 per cent had to be broken.

Besides this feature, the big blast hole method entirely eliminates the benching of the ledge and also to an experienced blaster affords the opportunity of so handling his explosives as to throw down his rock over a large area for picking it up by hand, or keeping it in a pile so as to readily pick up the rock with a power shovel.

Another advantage is that the drilling can be done ahead of time and the shots are so large that there can always be ample stone kept loosened so that the crushers can be operated to the maximum capacity.

There is still another feature that makes the big blast hole desirable and that is the fact that by this method fewer blasts are put off and thus there is less lost time than when a large number of lighter blasts are put off continually, followed by a large number of secondary blasts to break up boulders, several times a day.

The use of small tunnels, if properly laid out, can be recommended for extremely high breasts of rock, especially those over 100 feet in height, but even then holes should be drilled down from the top by the large machines in order to lighten the load on top of the tunnels and break up the rock so it can be handled.

Electrical Hazards in Cement Plants

A Paper Given Before the National Safety Congress

By MAJOR HENRY A. REININGER

Lehigh Portland Cement Co., Allentown, Pa.

A GREAT majority of cement plants are in far better condition today than they were previous to 1915. Much of the equipment furnished by the various electrical companies is now provided with safety devices which eliminate many of the accidents which occurred some years ago. Most of the electrical apparatus is operated at less than 550 volts, however, a great many of the plants are using high voltage from the central stations and transforming it to their required voltage. In general, the higher the voltage the greater the protection necessary. I am afraid too little attention is paid to the power-voltage currents, leaving many of the 110-volts contact points here. Serious and even fatal accidents are recorded from 110 and 220 volts. One hundred and twenty and 220 volts hitting a man when he is overheated and wet with perspiration, or where the floors are wet or damp, have proved fatal to men with weak hearts. Too much care cannot be paid to the placing of men on electrical work; they should be in good physical condition.

In cement plants, where we have the hazards of dust and dampness always with us, it is very advisable to place electrical machines, transformers, etc., in separate rooms and enclose them entirely and ample space should be allowed around these machines so that all conductors are easily accessible. All railings, platforms or any guard of metal construction should be permanently grounded when near electrical apparatus. Where apparatus has been placed in a separate room, the doors should be kept locked and every precaution taken to keep men unfamiliar with this work away from the machinery.

The question of repairing electrical apparatus and wires is one which causes considerable trouble. All wires or machines, of whatever voltage, should be "killed," if possible, and under no circumstances should any repairs be made on live equipment carrying 2,300 volts or higher. The best instruction to give all men repairing electrical work should be that all wires are alive. Any switches which are thrown out for repair work should either be locked or tagged and no one should touch them except the foreman of the repair gang. The rubber shields for men working on poles or around wires should be used at all times, and all tools, such as screwdrivers, wrenches, pliers, etc., should be insulated before being used.

Hand Lamps.—When using hand lamps men frequently work in close places, often overheated, their bodies are moist by perspiration or dampness, and offer very little resistance to the flow of eiectricity. Fatal accidents have occurred from 110 volts under these conditions. All portable lamps should have armor cable with a fibre guard and handle.

For linemen the combination tool and safety belt should be used at all times. Rubber gloves are also a protection. Good shoes, waterproof if possible, with rubber soles and heels are always a great protection to men working around electrical apparatus.

In regard to lighting around the plants, electrical codes of the various states take care of this problem. The disconnecting arc lights are probably

the best to be used around cement plants, for they are easily accessible for cleaning.

In regard to generators all of the moving and live parts should be guarded against accidental contact. This can easily be done by enclosing the rotary and exposed parts of the shaft by wire guards.

Grounds.—The current-carrying capacity of ground wires should be big enough to trip breakers, instead of burning at the grounds. No switches should be placed on ground lines. All metalwork in the vicinity of alternating ground circuits and conductors should be permanently and effectively grounded. All grounding connections should be as short and direct as possible and should be tested frequently to know that they are in working condition.

Switchboards. — All switchboards should have rubber matting in front of them and ample space so that a man can move back and forth without coming near the board. In the rear of the switchboards ample space should be allowed for a man to walk about without getting near any of the wires. The rear should be enclosed to keep out all except those men who are needed to work on the board. Exit should be provided at both ends, gates to open outward. Insulating covering, such as rubber matting, should be provided on the floors in the rear of switchboards. This covering may be laid on any good floor where the switchboard voltage is 2,300. Where the voltage is higher, insulated platforms should be used first and then covering. Cork carpet, linoleum and rubber matting have proven satisfactory insulating covering.

Fuses.—Open fuses should not be used. Another bad practice found in cement plants is the use of ordinary wire or nails in place of fuses between the terminals. The various new types of safety switches and fuse boxes have eliminated a great many electrical accidents; these boxes are so arranged that when they are open the switches are cut out and fuses can be replaced without danger. The question of switches, fuses, wiring, etc., is very well taken care of in the requirements of the National Electrical Code and the various lighting codes of the states.

Transformers.—Transformers should be placed in a separate room and kept locked; however, we find a great many transformers set out in the open. In this case all transformers should be protected with a high fence which will keep out all persons. Signs should be placed on the fences cautioning persons against the danger of electricity and warning them to stay away from the transformers.

With all the protecting devices which are now being placed throughout industrial plants we believe that education is far more necessary than guards, and we wish to impress upon all company officials that education of the foremen and the men should not be neglected. Signs should be used where possible and general talks on the hazards of electricity should be given to the men by officers of the electrical department or others thoroughly familiar with the subject.

All repairs should be made by the chief electrician or one of his men, and no employee allowed to make repairs around electrical machinery unless he is a member of this force.

One other thing of vital importance is the training of men in first-aid work. The electricians and foremen should be thoroughly familiar with the Schaefer method of resuscitation. Even though the plant is equipped with lungmotor or pulmotor, very often valuable time is lost in getting this apparatus to the scene of the accident and men should be instructed how to remove men coming in contact with live wires.

Unified Road System

Progress Being Made Toward This Goal—Other Capital Matters

By Our Washington Correspondent

Road officials all over the country are outlining programs of road building that will eventually link up state systems, according to the Bureau of Public Roads. A recent meeting of the New England State highway officials and engineers marks an important point in the development of highways in this country, says the bureau. This, it says, is the first meeting ever held between officials empowered to act, for the purpose of laying out a system of highways to serve an area larger than a single state. It is the first of a series of similar meetings which will be held between the Federal officials and highway authorities of various groups of states, the object of which will be the solution of the problem for the whole country. This progressive step, long wished for by all users of the highways, can be attributed to the requirements of Federal-aid legislation. It is required that all Federal aid be spent on a connected system of highways designed to serve the needs of the whole country. Tentative systems have been submitted by all except eight states, and now the series of meetings is being held to connect and co-ordinate the proposed state systems. The bureau intends to push this work as rapidly as possible, so as to lay before the people the plans for what will be by far the greatest highway system in the world. At present only roads certain to be on the system are being approved for construction with Federal aid. It is estimated that the system will comprise 180,000 miles of highway.

In connection with this final goal of 180,000 miles of Federal-aid roads it is estimated that about 20,000 miles already have been constructed and that about 15,000 miles are under construction. Including projects not yet under construction, Federal-aid roads in all stages now total 40,338 miles. There is no indication of any slackening of the greatly increased rate of progress which began with the season of 1921 as the states continue to pour in plans for new projects and place them under construction as rapidly as possible. Nearly twelve and one-half million dollars was obligated to new projects in June and July, alone. At the present time the force of the bureau is taxed to the limit with the examination of new plans and projects, inspection of roads under construction and the planning of the Federal-aid highway system which is being gotten into final shape.

But even with these plans pouring in the bureau finds time to give intensive study to the requirements of road building along almost every line. Just recently it perfected a device that tells what happens under a roadway as traffic passes over it. The device is one of the new instruments developed by the bureau in its efforts to discover what thickness of roadbed should be constructed for heavy or light traffic on various kinds of soil. Primarily the device measures, at desired distances, how the burden of traffic is distributed through the roadbed to the soil on which it rests. A thick roadbed lightens the load on every square foot of underlying earth or rock; a thin one places thereon more weight. How far distant from the surface point of contact—where load meets road—the weight is distributed and the possible formula for its distribution are being determined by experiment. When the facts are fully known and the traffic burden on the nearby and underlying soil is accurately measured, road makers will have a valuable guide as to the thickness of the roads they should construct on varying kinds of subsurface. A semifloating metal drum, an indicator, compressed air, slabs of roadbed made of different materials and thickness, and a measured load go into the making of the experiment, which will be conducted at the department's experimental farm at Arlington, Virginia.

And in this connection the bureau has perfected an instrument for testing soils on which roads are to be built. It consists of a metal disk resting on the soil and supporting a cylinder into which shot can be poured. The apparatus is held in position vertically by means of a tripod, at the top of which is mounted a small dial that tells to one-thousandth of an inch how far the disk sinks into the soil as shot is poured into the cylinder. By means of the instrument

it is possible to get information as to how the soil will act in wet weather. The kind of soil beneath a road surface has a great deal to do with how it will stand up under modern traffic, and engineers look upon this as an important consideration in determining the kind of road to be built. This is confirmed by a number of instances where two sections of the same road have been built in exactly the same manner and subjected to the same traffic but on different types of soil. One section has lasted well while the other has broken up in a manner that can only be explained by a lack of supporting power of the soil beneath the road. The bureau has for some time been investigating this question along various lines both in the field and in the laboratory, studying the characteristics of different soils and experimenting with means to keep down the moisture content of the soil and thus increase its bearing power. The latest development has been the new device.

What causes a "tarred" road to develop that peculiar scrubbing-board surface is a question that has been worrying the highway engineers quite as much as the long-suffering public. As often as not the symptoms appear in a macadam road that has been treated with asphalt. But the trouble is largely confined to roads built with tar or asphalt. Concrete and brick roads never develop such a surface, and ordinary dirt roads seldom do. The bureau is building at the Arlington, Va., experimental farm an experimental roadway 15 feet wide in an effort to discover the cause of the trouble. The road is laid out in the form of a circle with a 90-foot radius, and its circumference, 565 feet in length, is to be divided into sections, each of which will be surfaced with a different kind of asphalt or tarred surface. The experimental sections will be built exactly like actual road surfaces and when completed they will carry a "traffic" as much like actual traffic as it is possible to devise. The "traffic" will be supplied by a driverless motor truck which will be held to the circular path by means of a long arm extending from the center. The course of the truck will be altered from time to time so that the entire width of the roadway will be traveled. It has not been possible to determine the cause of observation of actual roads because there are too many unknown quantities. The defect may be due to distortion of the earth under the road surface or to defects in the surface itself. It is probably caused in some way by the wheels of motor vehicles—how and why the engineers have not determined, largely because they have never possessed all the facts with regard to surface and subsurface conditions and character and weight of traffic.

And here is one that will directly benefit the contractor and probably avoid a lot of controversy. It has to do with how smooth should a contractor reasonably be expected to make the surface of a road. Engineers of the bureau have devised an instrument for settling this question. When passed over the road it indicates the slightest unevenness or roughness. The instrument will be used to test the surface on different types of roads of good workmanship, thus determining a standard which contractors can be held to. Smoothness in a road is, of course, desirable for the comfort of travelers, but it is also desirable for other equally important reasons, say officials of the bureau. The vertical movement of a motor vehicle caused by roughness wears the machine and requires more power of the engine. In connection with experiments along this line another instrument has been devised. Attached to a vehicle this determines the amount of jolting or vertical movement caused by different degrees of roughness or unevenness in the surfacing.

The contract for the construction of the state-owned cement plant, to be located at Rapid City, S. D., has been awarded to J. C. Buckbee & Company, Chicago engineers. The plant will cost $1,300,000 and work will be started as soon as conditions permit.

The Ohio River Gravel Co., of Parkersburg, W. Va., recently obtained an injunction against C. D. Dotson, C. H. Wright and the Kanawha Sand Co., to restrain them from operating in the sand and gravel business in the vicinity of Parkersburg. The Ohio River Gravel Company maintains that at the time they bought these people out they obligated themselves not to engage again in the same line of business, and that they have recently opened up a competitive business.

Charged with Forgery

Other News of the Pit and Quarry Industries in Indiana

By Our Indianapolis Correspondent

Leonard Hodgen, of Kokomo, Ind., president of the Kokomo Stone Company, was arrested recently and taken to Marion, Ind., after the circuit grand jury there had returned four indictments against him. His bond was fixed at $8,000 and immediately provided. He is charged with forgery and with filing false claims. All charges in the indictments relate to the delivery and alleged delivery of stone by his company to Grant county for improvement of the highways. The indictment for filing false claims relates to a claim for $19,024.40 for the delivery of 11,094 tons of crushed stone last year when it is alleged only approximately 10,387.75 tons of stone were delivered and for another alleged false claim for the delivery of 6,010 tons. The indictments for forgery allege that he forged a waybill on carloads of crushed stone, which it is claimed contained 155 tons, but which was alleged to have been forged for 175 tons, and further that he filed a claim for $19,024.40 for stone which is alleged he knew was wrong.

The cement, stone and gravel producers and distributors in Indiana are watching closely the experimental and research work by the engineering department of Purdue University in co-operation with the United States bureau of public roads to determine the effects of different kinds of tires on roads; the effect of various sized loads and the different types of concrete construction. Two federal engineers will be assigned to Purdue shortly to make these tests with the university engineers. In the tire tests, the effect of the new solid tires with the old ones will be compared and the effect of solid will be compared to pneumatic tires. Different pressures in pneumatic tires will be studied and the recovery of strength after a pneumatic tire has passed over, will be determined. The research workers also will find the area of contact of a pneumatic tire with a slab when the tire is inflated at different pressures.

Next, the work will determine the critical load which may cause a failure in a concrete beam by fatigue and also ascertain the effect of conditions which may affect the critical load, to what extent fatiguing is accomplished by heat and the effect of variation in the richness of the mixture. These lines are a continuation of the work already under way at Purdue. However, another line of work is to be undertaken which includes road tests of concrete slabs to study strength and distribution of stress in different designed concrete road slabs. While the University is taking up these studies for the special benefit of Indiana roads, the results will be available for the United States bureau for the entire country. Purdue is the only institution where such work is being done.

More than a thousand taxpayers in Central Indiana met recently at Noblesville, Ind., and formed a permanent organization for the purpose of reducing taxes by a suspension of all road improvements for a period of three years. Some of the speakers declared that half the money paid in taxes either was spent for the construction of new roads or the repair of old. There was a strong sentiment at the meeting for the repeal of the three-mile gravel road law in Indiana and also for a modification of the automobile license law so that the money from this source can be distributed among the various counties of the state rather than go to the support of the Indiana Highway Commission.

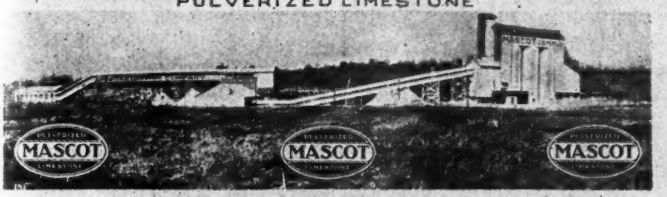
The Indiana Quarries Company at Bedford, Ind., has awarded the contract for the construction of a stone mill to replace the mill lost some time ago by fire. The new mill, with machinery will cost approximately $400,000. Work is to be begun at once. The building will be of brick, stone, reinforced concrete and steel and will be fireproof.

Four Martinsville, Ind., men and four Indianapolis men have filed articles of incorporation for a company, capitalized at $1,000,000 for the purpose of promoting a stone quarry in the heart of the Oolitic limestone belt, near Ellettsville, Ind. The land to be quarried has been thoroughly cored and every core shows it to be of the finest buff Oolitic limestone. There are 194 acres in the trade and already one quarry has been opened. The quarries will be electrically equipped and will be among the largest in Indiana. There have been eight sites picked for quarries. The

AMERICAN LIMESTONE COMPANY

"MASCOT"

PULVERIZED LIMESTONE



KNOXVILLE, TENN

Sept. 12, 1922.

OUR BANKERS SHAPE THE POLICY OF OUR AGRICULTURE.

ALL CONTRACTS AND AGREEMENTS ARE CONTINGENT UPON STRIKES, ACCIDENTS, DELAY IN MILL DELIVERIES, AND OTHER OCCURRENCES BEYOND OUR CONTROL

Mr. Wm. C. Beacham, President of the Peoples National Bank, Greenville, S. C., in a letter sent to the farmers of Greenville and surrounding Counties urging that on account of general invasion of boll weevil, more attention be given to soil building and the necessity of growing on the farm all the food and feed necessary, concludes his letter with the following paragraph:-

"LIMESTONE is highly recommended for use in connection with grain and hay crops, increasing the yield and materially improving the land for all crops. Our farmers should at least experiment to some extent with Limestone in order to learn its value, and we have decided, therefore, to furnish it to those who wish to do so at cost".

This Bank made arrangements with a local Fertilizer Company to store and handle Limestone for the farmers at cost of handling.

This Bank knew that its farmer patrons should be able to get Limestone as they needed it and when most convenient for them to haul, and in order to encourage their farmers into the habit of using lime, furnished this service.

Stocks of Limestone should be carried at every loading station.

Very truly yours,

FS/B

Sales Manager.

"MASCOT IS THE STANDARD AGRICULTURAL LIMESTONE"

This kind of circularizing helps sell limestone.

directors and sole owners of the corporation are James R. Gum, Eugene C. Shireman, Everett Lowder and James Wampler, of Martinsville, and Roy McNair, Clark E. Mallery and Fletcher and Walter Johnson, all of Indianapolis. The men bought the land four years ago with the expectation of opening a quarry, but only recently was the company incorporated. They also hold an option on thirty-five adjacent acres.

Stone Convention Date

During the Convention of the National Crushed Stone Association, which will be held in Chicago, January 15, 16 and 17, more attention will be devoted to operating practice than in conventions of the Association held in former years. It is the intention, so far, to go over everything about the operation of the quarry and crushing plant, from the stripping of the overburden to the loading of railroad cars with the finished product.

Some items of the program have already been tentatively arranged for and it appears that, when the Association meets in January, its time will be laid out very profitably over the three-day session. Even if the program does nothing more than give the Convention a flying start along the right lines, it will still be of considerable value. Much of the best material that the Convention will bring out will, of course, come spontaneously and without prearrangement from the membership.

During the same week that the Crushed Stone Convention will be held in Chicago, the American Road Congress will also be running in Chicago and this affords another substantial reason for the choice of time and place. It is quite unlikely that anything will change the intention of the Stone Association Directors to hold it at the time and place specified above, but official announcement has not as yet been made.

Special Convention

A constitutional convention, for the purpose of adopting a new constitution and by-laws for the National Association of Sand and Gravel Producers, will be held in Chicago on November 15, at 10:00 o'clock, at the La Salle Hotel.

A Ruggles-Coles Class F-O dryer has been recently sold by the Ruggles-Coles Engineering Company, 120 Broadway, New York City, to the Silica Products Company, Lowville, New York, for drying their sand. A Ruggles-Coles Class B-2 dryer has also been sold by this company to the Brown Corporation, La Toque, Quebec, Canada, to be used for drying their lime sludge.

New Drag Scraper

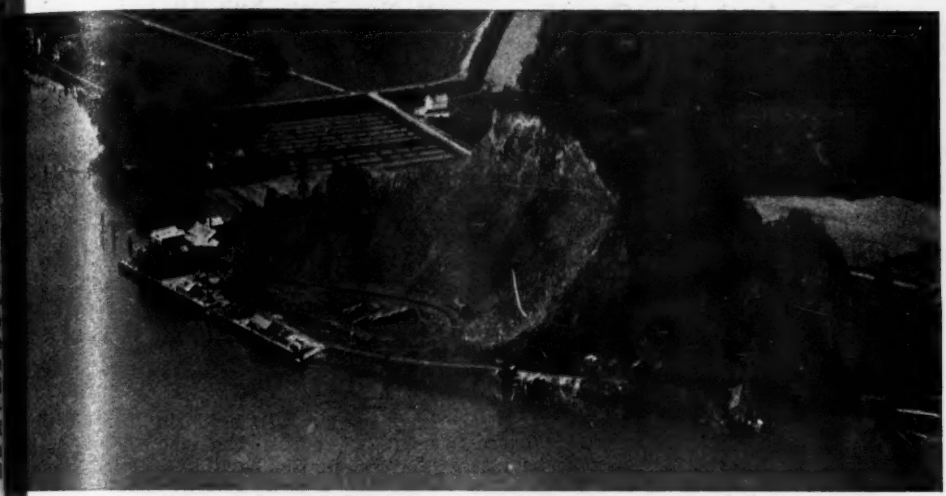
A new type of portable power drag scraper equipment especially suitable for use in small sand and gravel pits, for cut and fill work on highway construction, or for storing and reclaiming loose materials, has been brought out by Sauerman Bros., 312 S. Dearborn St., Chicago.

The new outfits are equipped with "Crescent" type power scrapers, which are especially suited for use with a light power unit as they are easy to pull and travel straight. The double drum hoist is furnished with gasoline engine direct connected, or is arranged for belt drive from tractor or other motive power. The truck frame is of heavy steel channel construction mounted on broad tread, grooved steel wheels with steel axles.

Any laborer on the job can operate a Sauerman portable scraper outfit. One man handles the entire operation through two levers placed side by side. There is nothing for another man to do, for the scraper just has to be dragged back and forth, loading and dumping being accomplished automatically at the will of the operator. The front drum of the hoist operates the "load" cable which leads through a sheave from the drum to the bridle chains on the front of the scraper. The "pull-back" cable leads from the rear drum through another sheave out to a guide block at the far end of the excavation, and then is attached to the rear bridle chains of the scraper.

The entire outfit can be made ready to move in a jiffy and in less than an hour after arriving at new location it can be in operation. In moving from one set-up to another, simply wind the cables on the drums, disconnect the bridle cable, put the scraper and blocks on the truck, hook on the tractor, motor truck or team, and pull out. At new location sink the wheels of the power unit into the ground, connect bridle cable to new stakes or deadmen, locate guide blocks, haul out the cables, hook onto scraper bucket, turn over the engine and go.

These little outfits are modest in price, yet embody the same quality features of design and construction that are found in the large Sauerman power scraper and dragline cableway excavator equipment.



Airplane view of Star Sand Company's operations at Coffin Rock, near Long-Bell valley property, four miles west of the mill site. It is 200 feet high, and is reputed to be an old Indian buria ground. The sides are very steep. The rock is covered with trees and is a beauty spot.

Viewed By Airplane

The above photograph of the plant and operations of the Star Sand Co., at Coffin Rock, near Kelso, Washington, has two unusual features about it. One is that it was taken from an airplane, and the other is that it is shown in a house organ of a prominent sawmill and lumber concern. The Long-Bell Lumber Co., which is now creating a great milling plant near Kelso on tht Columbia River in Washington where the company owns 70,000 acres of fine timber. In a bulletin describing the progress of these operations there are a number of airplane views, one of which shows the operations of the Star Sand Co., at Coffin Creek, near the Long-Bell Valley property four miles west of the mill site. The so-called Coffin Rock is said to be 200 feet high and is reputed to be an old Indian burial ground. The sides are very steep and the rock is covered with trees and is a beauty spot. The crusher plant stands next to the river.

The Wheeler Lime Co., Nashville, Tenn. with a capital of $200,000 has recently filed articles of incorporation. The incorporators are: F. H. Wheeler, H. A. Williams, King Sparks, W. Bush Sneed and Wm. Hume.

Bucket Loader for Stripping

Barber-Greene self-feeding bucket loaders are being used for stripping a gravel deposit in De Kalb county, Illinois.

On the best day one man and a machine loaded 104 trucks in 10 hours. Each truck has a capacity of 2 cubic yards, but in this case, the trucks were loaded high and were well trimmed. Figuring the minimum load at 2 yards, the total amounts to 208 cubic yards. Figuring that each truck carried 2¼ cubic yards, which is nearer right, the 104 loads amount to 234 cubic yards.

Had the ground been pulverized as well as plowed, it would have been possible to have loaded much more. Notice the many large hard lumps. Plowing is none too good at times, as a truck is used to pull the plow when horses are not available. However, in spite of the conditions of the ground, only one man was used to operate the loader and the feeding discs were not aided by any shovelers.

Costs (without depreciation figured) are given below for the best day:

10 gals. of gasoline for loader at $.212 per gallon	$2.12
2 quarts of oil for loader at $0.25 per quart	.50
1 operator for loader at $0.45 per hour	4.50
	$7.12

Cost = $7.12 ÷ 234 = 3 cents per cubic yard.

Fair Activity Continues

Prices in the East Remain Firm Despite Seasonal Decline in Demand

By Our Eastern Correspondent

There is an optimistic tone in the sand, gravel and crushed stone markets at New York and vicinity, despite the fact that business is a little more limited than that prevailing a few weeks ago. Producers continue to maintain fair activities under favorable weather conditions, with building supply dealers seeking more business in practically all commodities. The seasonal lag in construction operations, not unexpected, may be held as largely responsible for the drop in trade, but the new work in sight gives well justified encouragement in the situation.

Prices show no tendency to follow the downward trend of sales, for they are holding firmly at now well-established levels, and as in the case of cement, advancing to higher figures in a number of instances. This is bringing a little reaction, for important construction projects await more general stability than found in a fluctuating market. Sand, gravel and kindred products feel the effects of this condition and necessarily are dependent upon other basic commodities for volume sales.

Stone quarries, sand and gravel producers and affiliated lines are making the most of the seasonable weather, and with distribution lowered, the opportunity to stock up for the winter months is being given full play. As a consequence, there is every assurance that early spring supply will be more than equal to the demand. Building supply yards are curtailing orders to a point of current reasonable call, and the majority of yards in this section are quite well stocked.

First grade, washed sand is quoted at a $1.00 a cubic yard level in cargo lots. A year ago this time, the material was selling for $1.25 in the wholesale market. Building material dealers continue to ask $2.00 a cubic yard, delivered on the job. Fine white sand holds at $4.50 a cubic yard, delivered.

The best gravel is obtainable at $1.75 a cubic yard in carload lots, wholesale, at New York, both 1½ and ¾-inch sizes. This is about 25 cents below the price in October a year ago. Supply yards continue to quote $2.75 for the material delivered at the job site; long hauls carry a proportionate increase. Grit is being retailed at the same figure.

There is no change in the levels for broken stone; 1½-inch material is selling for $1.65 a cubic yard, carload shipments, wholesale, and ¾-inch at $1.75. Likewise, the same price of $4.00 at the supply yards for delivery on the job, quoted in the last issue of PIT AND QUARRY, continues to prevail, and this figure is now quite generally recognized as the standard trade quotation.

Advancing mill bases in the line of Portland cement has lead to another increase in the retail market at New York, and dealers are now asking $3.25 a barrel, as compared with $3.20 a month ago. The customary bag rebate of 10 cents holds. The wholesale situation shows even a more marked advance, for from $2.60, the figure of a month ago, a rate of $2.75 is growing in popularity, with a few sales still recorded at $2.65 and $2.70. For f. o. b. alongside dock material to dealers, the price is now $2.55 a barrel. A month ago, this latter figure was $2.30, while a year ago it was around $2.10.

Barreled common lime is quoted at $2.80 to $3.15 at the warehouse, while barreled finishing stock is around $3.64. Hydrated finishing lime, wholesale, is priced at $16.90 to $16.18 per ton, while common hydrate stock holds at $13.10 a ton. Finishing lime, delivered from the dealers' yards, 300-pound barrel, is selling for $4.50 a barrel; common lime, same size container, is priced at $3.75 a barrel, delivered. Hydrate finishing lime, paper bags, is selling for $24.00 a ton, while hydrate common, paper containers, is quoted at $19.50. Neat cement wall plaster, in cloth bags, is available at $21.00 a ton, delivered on the job. An early advance in lime and plaster prices is anticipated.

The Crystal Sand & Gravel Co., Boston, Mass., has been formed under state laws with a capital of 1,000 shares of stock, no par value, to operate a local plant. John W. Pearson, 132 Church Street, Newton, Mass., is president and treasurer.

The Presbrey-Leland Granite Co., Barber Building, Brattleboro, Vt., has awarded a building contract to the

Palmer Corporation, Holyoke, Mass., for its proposed new plant on local site, to consist of a main one-story granite-working plant, 135x265 ft., to be equipped for cutting, polishing, grinding, etc.; one-story machine shop, 60x90 ft.; and office building adjoining. 30x50 ft. The new plant will cost about $150,000, including machinery. W. S. Martin, head of the company, is in charge.

The Boston Sand & Gravel Co., Boston, Mass., is maintaining active operations at its properties, with local distribution of sizable account. Throughout the present year, business has been increasing in volume, with August, the last month for which a statement has been issued, showing a net income of $25,131, or a gross business of $65,750. For the twelve months ending August 31, the company reports a net balance of $167,497, as compared with $141,233 for the previous year. The gross business for the last year, 1921-22, was $560,842. The balance sheet of the company shows total resources of $2,659,891.

Effective October 1, the Vermont Marble Co., Proctor, Vt., has made a general advance of 10 per cent in the wage scale at its quarries and plant, affecting about 3,000 employes.

The Hallowell Granite Works, Granite Hill, Hallowell, Me., is rebuilding the portion of its machine shop, recently destroyed by fire, with loss of about $15,000.

The Genesee Sand & Gravel Corporation, Buffalo, N. Y., has been organized under state laws with a capital of $100,000, to operate local sand and gravel properties. It is headed by H. L. Perney and J. E. Jeplowitz; and is represented by B. D. Reisman, attorney, Buffalo.

The Trenton Lime Co., Remsen, N. Y., has filed notice of increase in capital from $40,000 to $625,000, for proposed expansion.

The Syracuse Sand Co., Syracuse, N. Y., has arranged for a stock issue of 2,000 shares of stock, no par value, the proceeds to be used for proposed general expansion.

A decision is soon expected from the Court of Appeals, Albany, N. Y., with respect to the constitutionality of the Donnelly anti-trust act, under which the Buffalo Gravel Corporation, Buffalo, and other companies in the same line of industry in this section, have been indicted. The action is the result of the recent Lockwood legislative committee investigation.

The Pittsburgh Limestone Co., Altoona, Pa., has resumed operations at its local quarries in this district, following a curtailment for nearly two years. Extensive operations are projected. The output of the property is used for the most part at the Braddock Works of the United States Steel Corporation. The Pittsburgh Limestone Co., maintains headquarters at New Castle, Pa.

The Pennsylvania State Industrial Board has handed down an important ruling holding that a minor between sixteen and eighteen years of age may serve as an apprentice in stone cutting, but not at a quarry. A general investigation of apprentices in the industry has been ordered.

The Falls Creek Sand & Stone Co., Clearfield, Pa., is running under heavy output at its plant, giving employment to a normal working force. Heavy blasting work is being conducted; a recent charge, late in September, required 16,000 pounds of dynamite to fill 75 holes for loosening about 20,000 tons of sand. Arrangements are being perfected for another charge of about 25,000 pounds of dynamite at an early date.

There is a noticeable scarcity of railroad cars for sand and gravel transportation in Pennsylvania at the present time, and producers are doing their best to overcome the situation. An appeal has been made for sufficient cars to supply current demand. The shortage is resulting in the accumulation of stocks at a number of plants, covering material which has been on order for some time past.

Thomas S. Donnon, Slatington, Pa., a prominent slate producer of this section, died, September 20, at his local residence at the age of 78 years. He was one of the early operators in the slate industry here, commencing in 1863. At one time, he conducted the Lehigh Slate Co., and later carried on a quarry at Slatedale, Pa.

The Coopersburg Improvement Co., Cooperburg, Pa., is at the head of a project to establish a local granite polishing plant. A site has been selected.

The Edison Portland Cement Co., of Orange, N. J., recently announced a wage increase of five cents per hour for the mill employees, effective on September 15th.

Priority and Car Supply

Together With Other Matters of Interest From the National Capital

By Our Washington Correspondent

Meagre reports to the headquarters here of the National Sand and Gravel Association fail to show conclusively what effect the recent Interstate Commerce Commission order No. 25 has had on the industry, but as far as T. R. Barrows, recently appointed executive secretary to succeed E. Guy Sutton, is able to conclude a large number of producers have derived relief from the provisions of the order while there are still some who have not yet felt its benefits. On the whole, however, it is the belief of Mr. Barrows that the industry generally has been benefited.

Secretary Barrows is urging members of the association who are being cut off or greatly restricted in their supply of cars to immediately report their cases to the association and they will be handled individually before the commission. Through Mr. Barrows, the association is now negotiating with the commission and with the railroads direct in several individual cases and it is the belief of officers of the association that much good can be accomplished by bringing these cases individually to the attention of the commission in order that the commission may be constantly reminded of the excellent effects some of the priority orders have had. The association takes the stand that the principle of priority is in itself wrong and efforts have been made and are now being made before the commission to have this principle set aside.

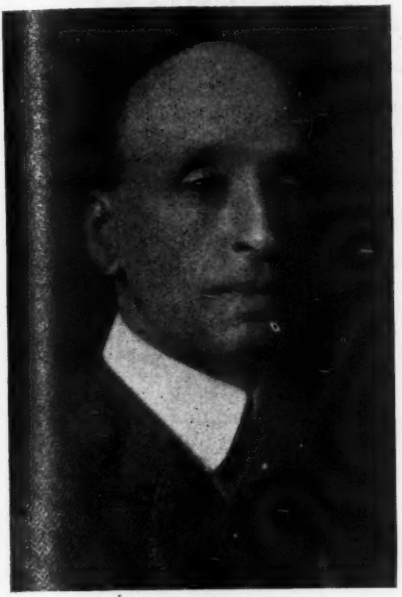
It has been ascertained by the Washington headquarters that, for the present at least, there will be no limitations placed upon the free use of the reconsignment privilege by the commission during the existence of priority orders. Commissioner Aitchison recently communicated with Federal Fuel Distributor Spens on the question of reconsignment privileges, and Mr. Spens replied that he did not believe the reconsignment privilege should be restricted in any manner, because "in some instances it expedites the unloading of coal." The fact that free reconsignment during car shortage emergencies also encourages the loading and constant tie-up of coal cars for which there are no purchases has apparently not suggested itself to Mr. Spens.

An appeal by the association for a modification of the priority orders, which also included an argument against priority orders generally, was made by the association on September 21, but up to the present time it has been impossible to obtain a definite statement from the commission as to when a decision will be forthcoming. Association officials, largely through Secretary Barrows, are in constant touch with members of the commission and are losing no opportunity to impress them with the importance of the industry and the suffering to which it has been and is still subjected.

The most serious complaints of car shortage that the association has received come from members west of the Mississippi. It is shown in some of these cases that there has been a complete denial of transportation facilities. In these cases the association is making a special effort to obtain relief, but up to the present little or nothing has been accomplished.

Mixing cement with certain types of soil to alter the characteristics of the soils and make them more suitable for road surfacing and subgrades is an experiment recently conducted by the Bureau of Public Roads, which is now proving its value in actual use. The treatment was first suggested and tried out at the Arlington Experimental Station of the bureau. Results warranted a field test, and it was arranged with the California State Highway Department to try it on the adobe soil there. A part of a Federal-aid project in Solano County was selected for the test. The dry soil was well broken up and harrowed to a depth varying from 6 to 12 inches and mixed with cement in the proportions of 1 part cement to 10 parts soil and 1 part cement to 20 parts soil. It was intended to water and roll the surface, but rain prevented. One section was allowed to remain untreated for purposes of comparison.

A recent inspection showed that the untreated section was badly broken up, due to the usual shrinkage cracks characteristic of adobe soils. The treated sections were in good condition and showed no shrinkage cracks. The treatment is not intended to make a



T. R. Barrows, Executive Secretary Nat. S. & G. Assn.

hard surface like concrete, but to alter the properties of the soil so that it will be stable and lessen the effects of moisture. California plans to conduct additional experiments, which will be observed in detail by the bureau and cost data obtained.

Greater standardization of practice in the design and construction of highway bridges is urged by the bureau. It is believed that there is no sound reason for the amount of variation in specifications that now exists and that it results in greater cost of bridges. State officials take the same view as the bureau and a committee composed of bridge engineers has been appointed by the American Association of State Highway Officials to consider the matter. A "Manual of Practice" is being prepared, which will represent the best thought on the subject and which it is believed will be accepted by all the State highway departments. Not only will the adoption of such a manual lead to the building of bridges of good design, but it will also make possible a saving in money, as bridge companies will not be called upon to meet so much variation in design.

Sacks Make Trouble

They Are Blamed for Unbalanced Conditions in New York

Something like a million empty cement bags are already impeding, and threaten to almost entirely block building construction progress in New York.

It is a situation that has never occurred here before. It is improbable that circumstances could easily bring about such a difficulty again. Furthermore, responsibility for the dilemma now confronting the eastern building construction industry is so scattered that there seems nothing else to do but to patiently await the slow return of normal trade and traffic conditions.

Soon after the anthracite strike began the cement manufacturers, being heavy consumers of coal, found it difficult to meet delivery schedules. Meanwhile empty cement bags had been accumulating in the hands of dealers following a long period of great building activity. Cement bags are good for ten cents each, four bags to a barrel, if returned, freight prepaid, in good condition to the manufacturers whose name is stamped thereon. Dealers as a rule wait until they obtain a worth while quantity of these bags and then make a lot shipment back to the mills. As a building operation will take hundreds or even thousands of bags of cement, not to mention operations allied to, but not directly identified with building construction, and dealers each frequently have a dozen or more jobs moving at the same time, the summer's accumulation of empty cement bags amounted to more than half a million for New York alone up to the first of this month.

Then the cement companies, finally enabled to obtain fuel, proceeded to turn to capacity production only to find that they were running short of cotton bags to put their cement in for shipment. When they were on the point of ordering more they were confronted with the difficulty of getting deliveries from the cotton bag mills.

When the embargoes on east-bound freight checkmated them at that point they began to send out cards to the New York dealers asking them not to hold their cement bags so long, but to

ship them back. So the dealers bundled their empty bags on trucks and took them to the railroad yards.

That is where the present serious hitch came. The railroads explained about the embargo. They were sorry but they could not accept that kind of freight, so back the bags went to the yards of the mason material dealers, almost a million strong.

Now the dealers are wondering when the manufacturers are going to ship cement to them so that they can replenish their fast diminishing supply. The manufacturers are wondering where they are going to get bags from to take care of the vast amount of cement they are manufacturing and the demand that promises this year to bring production for cement mills of the country far over the hundred million barrel mark.

Autumn Business Good

Pittsburgh Maintains Production and Distribution on Extensive Scale

By Our Pittsburgh Correspondent

The advance of the fall season has not shown any marked change in the activity in the sand and gravel markets at Pittsburgh, Pa., and vicinity, and all of the larger producers are maintaining heavy digging and distribution. Banner weeks in sand output have recently been recorded in this section, towboats ranging as high as 12,000 to 15,000 tons of material hauled in a seven-day period, or on a basis of from 45,000 to 50,000 tons per month. River traffic continues at a good point, with company fleets making the most of the present good weather.

Prices maintain substantially at levels which have prevailed for some time past. Washed gravel is selling for $2.00 a yard, delivered on the waterfront, with figures of $2.50, $2.75 and $3.00 for delivered material under distant hauls. For f.o.b. float stock, the quotation is $1.60 per cubic yard. Crushed stone holds at $2.85 a cubic yard in cargo lots, wholesale, in the Pittsburgh market, both for 1½ and ¾-inch material. Retail, dealers are asking from $4.00 to $4.50, with some sales as high as $5.00. River sand is around $2.35 for delivered stock.

The Rodgers Sand Co. is one of the active producers at the present time and is keeping its fleet exceptionally busy to and from the local port. Hauls are being made from Cheswick, Duquesne and vicinity. Large output is in progress at the company's diggers at Fourteen-Mile Island, with the "Sweetcake," "Twilight" and "Margaret" towboats doing heavy duty with barge loads of material for the Pittsburgh market. Deliveries are also being made at Duquesne and Bessemer, as well as Monessen, Rostraver and vicinity. The company has contracted to dredge about 15,000 square yards of sand and gravel at Elrana, on the Monongahela, for the construction of a new loading dock. The company has also been dredging a winter harbor at Creighton for the Crucible Fuel Co. The sand digger, "Flora," has been busy at Woodlawn and Ambridge.

The Keystone Sand & Supply Co. has been engaging in the Twelve-Mile Island section, using its towboat, "Peace," for hauls to the Pittsburgh ports. The different sand diggers are running under normal output, and heavy distribution is under way for a number of interests. The company has contracted with the Dravo Contracting Co. for the construction of three new barges for its river traffic.

The Iron City Sand Co. is keeping its sand digger, "Independent," in active service on the Monongahela River, at the foot of Wood Street, with the towboats, "Victory," "Iron City," and "P. M. Pfeil," making large hauls from this point. Deliveries are being made at a number of distant points, including Morgantown, W. Va. The gasoline towboat of the company, "Relief" is also in active service.

The Standard Sand & Gravel Co., Wheeling, W. Va., is one of the busy companies in this district, and is adding to its fleet in anticipation of extended operations. The new boat will be known as the "Sandow," and is being built by Mozena Brothers. The machinery will be installed by the Marine Mfg. & Supply Co., Pittsburgh.

The Niagara Stone Products Co., Bellefontaine, Ohio, has been incorporated with a capital of $200,000. The plant will open about the first of November and it is planned to open a magnesia plant in connection with the quarry about the first of the year.

Foresee Steadier Trade

Cincinnati Sees Many Hopeful Features in the Business Outlook

By Our Cincinnati Correspondent

Basic material operators in the Cincinnati district are growing optimistic under conditions which hold a firm market for future transactions. Operations have been severely handicapped by disarranged railroad service, an acute shortage of railroad cars greatly impeding production and shipment on contracts during the past weeks. With the railroad difficulties showing indications of improvement, pit and quarry operators as well as building material men foresee steadier conditions, broken only by the regular seasonal interferences.

An encouraging opinion barometric of conditions in the sand, gravel and cement industry, indicative of a future volume of business, is the forecast of George Doran, of the Cincinnati Quarries Company, who declares that although demands for spring are not as great as may have been hoped for, the trade will not suffer because of the retrenchment policies of municipalities as has been the past experience of the last two years. According to Mr. Doran cities which have been conserving their financial resources through cutting down of street repairs have seen the folly of allowing streets to deteriorate and now appreciate that immediate repairs are necessary.

With the largest scale of building operations experienced in many decades being rapidly advanced in Cincinnati, building material operators have been enjoying a maintained volume of business. This is attested to by J. Cornell, of the Red Bank Gravel Company, who says that the building boom has saved local producers from considerable loss, counteracting the bad effects of the railroad conditions.

Materials cannot be shipped nor secured according to F. F. Brockamp of the F. F. Brockamp Supply Company, who looks to the picking up of residence construction as the most encouraging point in his favorable outlook.

That the railroad situation is not as bad as in other localities and that the "outlook is favorable" is the statement of E. Zimmerman of the Ohio Gravel Ballast Company. Considerable business is booked ahead and contracts are being filled fairly successfully according to the Ohio Gravel Company's report. "Cincinnati, as a railroad center of north and south, has afforded an exchange of railroad equipment which basic material producers have used to advantage," is the way Cincinnati has profited, declares Mr. Zimmerman. Two of the seven operations of the company are closed with the remainder to be stationary December first, with further shipments to be made from the company's storage pile.

The railroad strike has directly affected demand for crushed stone and ballast, the roads making little or no track repairs.

The price of Gypsum remains firm, Port Clinton material prices at $13.90 per ton in paper sacks. The shipment of gypsum has been curtailed through shortage of cars, gondolas and cattle cars being the source of conveyance to carry this product from the operations.

Little supply and keen competition is the report emanating from The McGamman Bros. Company on the cement and lime market, the price of lime approximating around $12.40 a ton. Ruebel, Weaver and Koenig Company confirms the firm condition of the market and look for brisk prices.

Basic material men assert that the time for contractors to build is the present and speculative contracts for the future with the expectance of lower prices in builders supplies is a false principle.

Slate Investigations

The slate inquiry begun by Dr. Oliver Bowles, mineral technologist of the Bureau of Mines, has been completed. The study involved visits to practically all working quarries and finishing plants in the country. The purpose was to promote efficiency and waste elimination in the industry and to find uses for unavoidable waste. Several short reports were issued and a final bulletin was submitted for publication. An important development was the establishment of a National Slate Association for the exchange of ideas, for improvement in the conditions in quarries and mills, and for development of the transportation, distribution, and sale of finished products.

Labor and Transportation

These Are Limiting Factors in Cement Trade—Other Notes of the Mills

Cement production in the Lehigh Valley district of Pennsylvania continues at a high point. Practically every large mill is running at capacity or as near to this point as possible. The two distributing factors in the situation are labor and transportation. Men are growing exceedingly scarce, and there is a keen bidding for labor; no man willing to work need be idle in this section at the present time. The present situation has been brought about by workers leaving their jobs in the mills and securing work at high wages in the coal mines and neighboring steel plants. To offset the condition, general wage increases have been placed into effect at the majority of mills.

The railroad embargo does not improve the situation, and all cement-carrying roads in this section are now holding to a curtailed hauling schedule. As a consequence, stocks are accumulating at the plants which, in reality, should be in the hands of consumers and dealers. When the condition is relieved, the shipments from the mills are expected to reach record-breaking proportions.

The fuel question is righting itself in a satisfactory way, and all mills are now in position to go ahead in this connection without any great concern. The incoming shipments of coal are allowing reasonable reserve. A number of the smaller mills are now able to resume under full production, following several weeks of curtailment.

Prices continue to advance, and a mill base of $2.25 has been established for the Lehigh Valley district, as compared with a rate of $2.20 a month ago, and previous to that, $1.90. This tendency to high levels has been prophesied in recent issues of PIT AND QUARRY, and the maximum does not as yet seem to have been attained, at least a stable figure for the winter months.

The Atlas Portland Cement Co., Northampton, Pa., is running under heavy production at its large local mill. The plant has been so busy that the customary plan of shutting down for a day for the district fair, held at Catasauqua late in September, was abandoned. Wages have recently been advanced at the plant for all classes of mechanics and laborers. The fuel situation is good at this mill, and reserves on hand insure continuous production to all desired extent. The accumulation of cement stocks will be materially depleted as soon as rail facilities are available.

The Lehigh Portland Cement Co., Allentown, Pa., has resumed full production at its plant following the settlement of a strike of operatives. The company has granted a 20 per cent wage increase, affecting all classes of labor, or approximately 700 men; the employes have no union. The New Castle mills are running at maximum, with shipments at the highest allowable point. The mill is said to have heavy orders on hand, insuring continuous operation for an indefinite period. The other mills of the company are on the active producing list. The company has perfected plans for its proposed expansion covering the construction of a new plant in Alabama, of which further mention is made below.

The Whitehall Cement Mfg. Co. is operating at good capacity at its mill at Cementon, Pa., with employment of close to normal working force. Every effort is being made to keep the number of employes sufficient for all departmental operations. The mill has a good volume of orders ahead, and is expected to continue on the present basis for a considerable time. The company has recently awarded a contract for the construction of nine new cement storage bins of silo-type, to increase the facilities for reserves.

Members of the Engineers' Club of the Lehigh Valley made a tour of inspection of a number of the cement mills, on the occasion of a recent meeting.

The Edison Portland Cement Co., Edison, N. J., is maintaining continuous production at its local mill, and a fair proportion of the output is devoted to export account. Domestic business is holding up well, and there is every indication of capacity operations for some time to come. The company has recently placed a wage advance of 5 cents per hour into effect, benefiting approximately 600 employes. In connection with the increase the company points out that men at the plant are now receiving more than 60 per cent in additional

wage as compared with the pre-war scale.

The Glens Falls Portland Cement Co., Glens Falls, N. Y., has arranged for an increase in capital from $600,000 to $1,200,000, for proposed general expansion. The local mill is in active production with employment of regular working force.

The International Cement Corporation, New York, N. Y., is resuming production at its Knickerbocker mill, following a curtailment caused by the coal and railroad shop strikes. The mill is now said to have sufficient fuel on hand for a good period ahead, and incoming orders will be handled with prompt dispatch. The working force has recently been increased, and is now understood to be close to normal.

The Security Cement & Lime Co., Baltimore, Md., has work under way on extensions and improvements at its cement mill at Security, Md. The company will install considerable new machinery and operating equipment to provide for an increase in output from 950,000 barrels to 1,400,000 barrels per annum. The local site comprises close to 150 acres of high-grade cement rock, which is estimated to provide a sufficient supply for the plant for more than 100 years to come. Arrangements have been made for a note issue of $300,000, to be used in connection with the expansion. Loring A. Cover is president.

The Louisville Cement Co., Louisville, Ky., has active work under way on the rebuilding of its mill at Speed, near Jeffersonville, Ind., which was partially destroyed by fire last July. In connection with the reconstruction it is planned to increase the former output of 1,800 barrels per month to 2,500 barrels, and considerable additional machinery will be installed for this purpose. A portion of the plant has been placed in service. The rebuilding and expansion is estimated to cost in excess of $300,000, or the amount approximately of the fire loss.

The Lehigh Portland Cement Co. has commenced preliminary work in connection with a large new plant on property previously acquired, about five miles from Birmingham, Ala., at a place known as Tarrant City. The tract comprises close to 500 acres of limestone properties; the initial mill will consist of a number of buildings, to be equipped for a maximum capacity of 1,000,000 barrels per year, and is estimated to cost approximately $2,500,000. The company now owns 15 cement mills in different parts of the country, a number being located at West Copley, Ormrod, Fogelsville and New Castle, in the Lehigh Valley section of Pennsylvania; and others at Mitchell, Ind.; Oglesby, Ill.; Mason City, Ia.; Fordwick, Va.; Iola, Kan.; and Metaline Falls, Wash. Headquarters are at Allentown, Pa.

The Phoenix Portland Cement Co., Nazareth, Pa., has active construction in progress on its proposed new cement mill, in the Birmingham, Ala., district, where a tract of land of about 80 acres recently has been acquired from the Sloss-Sheffield Steel & Iron Co. The initial plant unit is expected to be ready for operation late in the spring of the coming year. It will have an aggregate capacity of close to 1,500,000 barrels per year, and will represent an investment of approximately $2,500,000. The plant will be modern in every respect, and will be designed with view to early future extensions.

The Southwestern Portland Cement Co., El Paso, Tex., has concluded negotiations with the Chamber of Commerce at Phoenix, Ariz., for a local site for the construction of a new cement mill. Plans will be placed under way at once for the initial plant units, to consist of a number of buildings, including power plant, mechanical buildings, etc., estimated to cost in excess of $1,000,000. It is proposed to expand the works in the future.

Prices for cement in the different important mill districts are holding fairly uniform with a slight advance in certain localities. The tendency is for a nominal increase in prevailing mill bases, and before the close of the year a number of changes in this respect are anticipated. Present quotations are as follows: Universal, Pa., $2.00 per barrel in carload lots, without bags; Fordwick, Va., $2.35; Mitchell, Ind., Mason City, Ia., LaSalle, Ind., and Hudson, N. Y., are holding at the last noted figure, the Hudson rate recently advanced to this point from a previous $2.10 level. The base at Hannibal, Mo., is $2.00; at Leeds, Ala., $2.10, and at Steelton, Minn., $1.95. An increase at the latter place is looked for momentarily.

The Williams Lime Mfg. Co., Wilmington, N. Y., has been incorporated with a capital of $100,000.

Road Show Coming

Arrangements Going Forward for Convention and Exhibit in January

With the early start that was made during the summer through a partial reorganization and an election of officers in the American Road Builders' Association and the creation of the Highway Industries Exhibitors' Association to bring about closer cooperation, arrangements are rapidly being perfected for the Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show to be held in Chicago, January 15, 16, 17, 18 and 19, 1923.

The early beginning has enabled those in charge to perfect a working organization so harmonious and effective that conditions nearly 100 per cent perfect are assured for the next big double event. While many of the most important features of both congress and show will be retained, others both new and novel will be added.

It is the intention to separate the congress and show, by holding the former at the Congress Hotel and the latter as usual at the Coliseum. It is believed this arrangement will be more satisfactory as it will obviate the necessity of shutting down the operating machinery during the sessions and will eliminate the noise that has proved so annoying to speakers and delegates at the convention. The new arrangement is also expected to increase the attendance at each session of the congress.

Shortly after his election, Thomas J. Wasser, president of the American Road Builders' Association for 1922-1923, appointed to the Executive Committee the following: Charles M. Upham, state highway engineer for North Carolina; James H. MacDonald, consulting highway engineer, New Haven, Conn., and J. H. Cranford of the Cranford Paving Company, Washington, D. C. By reason of his position as secretary, E. L. Powers became ex-officio a member of the committee.

This committee, acting for the A. R. B. A., appointed Messrs. Upham and MacDonald, and the Highway Industries Exhibitors' Association designated its president, S. F. Beatty, vice-president of the Austin-Western Road Machinery Company of Chicago, to act as a committee having general charge of the arrangements for both the show and the congress. The committee is known as the Convention and Show Committee.

This committee has now created several sub-committees to have charge of the various detailed arrangements as follows: Transportation Committee, Royal M. Allen, chairman; General Publicity Committee, S. T. Henry, chairman; Chicago Press Committee, W. R. Harris, chairman; Exhibitors' Committee, C. R. Ege, chairman; Entertainment Committee, A. C. Cronkrite, chairman; Reception and Hotel Committee, John B. Hittell, chairman; Registration Committee, L. S. Louer, chairman; Banquet Committee, Joseph R. Draney, chairman; Program Committee, E. J. Mehren, chairman.

The Exhibitors' Committee has employed a professional director of exhibits in C. W. Kelley of Chicago, who, though never before identified with the road show, has managed some of the biggest expositions in the country, and the Publicity Committee has re-engaged C. S. Lee of New York, who handled the publicity work for the shows and conventions in 1921 and 1922.

"The program for the Congress as it is being worked out by the Program Committee, will be the exact reversal of our previous ones. Instead of avoiding controversial subjects as in the past the program next year will be made up almost entirely of controverisal subjects of interest to the road-building industry as a whole. This, we believe, will greatly increase the interest in the program and will provoke highly interesting and instructive oral discussions from the floor."

The American Road Builders' Association has opened new offices at 37 West Thirty-ninth Street, New York City, the old ones at 11 Waverly Place having been abolished. Headquarters will also be opened in Chicago long in advance of the congress and show.

The Relief Hill Consolidated Gravel Mining Co. has been incorporated at San Jose, Calif., with a capital of $75,000. Incorporators: L. H. Helwig, C. E. Landsburg, R. G. Landsburg, Eleanor Z. Helwig and Ethel A. Helwig.

All Depends on Builder

Way He Places Orders Will Control Prices for 1923

(Dow Building Report, New York Oct. 7)

Building costs, as affected by building material prices, in 1923 will be higher or lower than they are at present in proportion to the volume of forward business placed now.

If the building construction industry of the country anticipates the pending building material production jam by forward buying, prices will hold at or about present levels. Should there develop, on the other hand, a tendency on the part of investors in general to await possible building material price crashes in December, January or February, the consequent over-loading of building material manufacturing capacity may be expected to put further premiums upon the basic building commodities.

Building material production capacity was nearer its national maximum of orders this year than at any time, so far as records show. Fuel and rail difficulties interposed to prevent complete filling of these orders. There is a tremendous quantity of this back-log material ready to be shipped, but there is a car shortage of increasing dimension that is already affecting actual construction work. On October 1 there were buildings all ready for the tenants to move into, but which could not be passed because certain equipment deliveries had been delayed.

Meantime great quantities of construction work projected last spring are now ready for basic materials. Dealers have less than a week's supply of cement on hand although they anticipated far back in the early summer just such conditions as now exist. They filled their yards with more basic materials than they had carried in years and even then finishing lime could not be supplied fast enough, brick was frequently unobtainable, certain lumbers were not purchasable because dealers could not get them for immediate delivery and now cement is becoming not only difficult to obtain in New York, but in practically every city in eastern part of the country.

Cement and even hydrate finishing lime manufacturers are shipping at buyers risk these perishable products in open gondola cars, with tarpaulin covering, an expedient developed during the greatest wartime demand for cars and railage and motor truck caravansaries bearing building materials from mill centers are again being met with at night upon roads leading to New York.

Projected building construction covering the Atlantic seaboard has been one-fifth greater than it was at this time last year. In some sections all previous plan filing records have been exceeded. Besides this great volume of new work there is the back-log of last spring's projected building that had to be deferred on account of uncertainty regarding delivery of materials on schedule time during and after the strikes.

Taking cement as an illustration, manufacturers of this commodity say that while this year will mark the industry's high peak of demand, next year's requirement as now foreseen, will far surmount it.

Too many investors in building enterprises will walk into this building material production jam next year to make the outlook healthy. They are waiting for a season of lower prices.

Six months ago they had a fair chance of realizing their anticipations. Today conditions are different. Then manufacturers were beginning to catch up with their orders and could foresee a season when they could pile up reserves, a condition that has not been known since 1912-13. Lack of fuel and disjointed railway service blighted these hopes for building material producer and consumer alike and the condition of Atlantic coast building material supply at this moment is on a parity with the crucial periods of the war time demand, with this difference: everybody knew the war time rush was drawing to an end, whereas now everybody knows that backed by a period of national inflation, expected to result from the great crops harvested this year, the demand for building materials is only just developing.

Building costs for 1923 are in the 1922 builders' control. If they will spread their orders for building material requirements over the winter months so that manufacturers can make their production schedules up early and provide for sufficient capacity, prices of building materials will be kept within reasonable bounds next year.

Big Blast at Bethlehem

Brings Down 100,000 Tons of Flux for Steel Plant

A large blast was recently made in the flux stone quarry of The Bethlehem Steel Company, located across the Lehigh River from the big Bethlehem plant. Hercules dynamite was used for the shot, which consisted of 51 well-drilled holes averaging over 80 feet in depth. The shot, witnessed by coal producers of that section and by a number of quarry operators, was—but let the editor of *The Hercules Mixer* tell it in his own way:

"Our service men, whose calculations carried them past midnight, arose in time to start directing the loading of the holes at 7:00 a. m. A number of crews were organized to accomplish this work.

"A dolly, which is a piece of wood about four feet long, attached to a rope, was used, first, for determining the condition of the holes and checking their depth before loading, and, second, for tamping the charges and stemming material. Sixty per cent Extra L. F. was used in the bottom and Special No. 1 in the top of holes. Until the dynamite charge came above the water level, the cartridges were dropped into the hole without slitting them. After the water level was passed, the cartridges were slit and their contents poured in through large funnels which were placed in the iron pipes used for casing the collars of the holes. Hercules Special No. 1, in 4x12-inch cartridges, in the calculated quantities, was charged on top of the 60 per cent Extra L. F. In some cases, where the holes were too far below grade they were filled with screenings to give an average depth of the holes of about 8 feet below the quarry floor. The rope by which the dolly was lowered into the holes was marked at 25, 50, 75, and 100 feet, so that the progress of loading could be judged at any time. To lower the cordeau, a cartridge of 60 per cent Extra L. F., 4x8 inches, was fastened securely to the end of the cordeau and carefully lowered to the bottom of each hole. Then the dolly was let down to determine whether the cordeau had reached the bottom. The cordeau was then cut off about six feet above the top of the hole and securely fastened. Deck loading was employed wherever necessary; that is to say, the explosive charges in the holes were separated by layers of stemming where it was thought advisable. The distance of the holes from the face, the relative hardness of the formations at different points, the spacing of the holes, the total charge per hole, and the desired height of the charge in the hole, must be considered in deciding on the most advantageous deck loading. The experience and judgment of the man in charge must be relied upon in this phase of the preparatory work. If the charges are properly spaced in the hole, greater efficiency is obtained from the explosive and the rock is broken better for loading into cars. The work was done by four crews of about four men each, with a man directing each crew.

"Loading the holes was a full day's job. It took some time for the men in the different crews to get organized and to understand just what they were to do; as the day progressed the speed of loading increased. By the time the holes were all loaded and tamped, the quarry bench cleaned up, and the cordeau connections made, it was after six o'clock.

"Then came the blast. One electric cap was connected to the end of the cordeau and fired by a blasting machine. Like a pile of building blocks pushed over by an impatient child, the great quarry face tumbled down, the rocks spilling over one another and settling at a comfortable angle of repose at the base. The nearby highway, railroad tracks, and high-tension transmission line were not touched by flying rock, so correctly had the charges been calculated. By this shot 22,000 pounds of Hercules dynamite broke down 83,671 tons of limestone, or almost 4 tons of stone per pound of dynamite.

"No thinking person can fail to pause for a moment's deep reflection when he sees nearly 100,000 tons of stone broken down in an instant into pieces small enough to be loaded into cars. It is an overwhelming demonstration of the power of dynamite—the great constructor of civilization—which has been so aptly termed by Mr. Bacchus 'the New Alladin's Lamp.'

The Southwestern Rock & Gravel Co., Los Angeles, Calif., has been incorporated with a capital of $75,000.

$10,000,000 for Material

Los Angeles Spends This Amount in Its Building Program

From the Los Angeles Express

Ten million dollars is paid out annually to the producers of rock, gravel and sand, which goes into the construction of buildings in Los Angeles county. Approximately 15,000,000 yards of these raw materials are needed each year to meet the demands of local contractors.

These figures are taken from cost distribution sheets of the Builders' Exchange of Los Angeles, prepared by Secretary Roy H. Brown. According to Mr. Brown, the demand is as yet only in its infancy. Building now under way and contracts already planned have reached the peak in the building history of this section and indicate requirements in raw materials which will tax producers to the last ounce of their productive energy in machinery and men.

Figured in weight, it takes approximately 60,000 tons of these natural products to meet daily needs. Downtown construction is now almost totally confined to class A structures, in which concrete and steel are the basic elements in material. Cement, lime, rock, gravel and sand are the four necessary ingredients in the making of concrete, and to the class A building may, in consequence, be attributed this unprecedented demand for the raw products of Mother Earth.

Sand leads all the other elements in demand. City specifications, which read that concrete shall be mixed in the proportion of three and one-half parts of crushed rock to two and one-half parts of clean, sharp sand and one sack of cement, might convey the impression that rock was in leading demand.

On the contrary, there is about three times more sand used than rock in local building operations, due to the fact that the plaster which goes into construction of every character has lime and sand for its chief ingredients.

In compiling these figures Mr. Brown has given no thought to the needs of road and highway construction, where material necessary for use is ordinarily available close by.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,429,372. Sand and gravel loader. Jesse M. Shamp, Wooster, Ohio.

1,429,786. Rock-drill. William A. Smith, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,430,075. Scraper. Leslie P. Green, Chicago, Ill.

1,430,076. Excavator. Leslie P. Green, Chicago, Ill.

1,430,297. Rope-thrusting shovel. Walter Ferris, Milwaukee, and Svante R. W. M. Bager, South Milwaukee, Wis., assignors to Bucyrus Co., South Milwaukee, Wis.

1,430,298. Rope-thrusting shovel. Walter Ferris, Milwaukee, and Svante R. W. M. Bager, South Milwaukee, Wis., assignors to Bucyrus Co., South Milwaukee, Wis.

1,430,493. Rock-cutting machine. John W. Cook, Miami, Fla.

1,430,521. Mining-machine. Morris P. Holmes, Claremont, N. H., assignor to Jeffrey Mfg. Co., Columbus, Ohio.

1,430,522. Mining-machine. Morris P. Holmes, Claremont, N. H., assignor to Jeffrey Mfg. Co., Columbus, Ohio.

1,430,669. Mining and loading machine. Edmund C. Morgan, New York, N. Y.

1,430,764. Rock-drill. William A. Smith, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,430,782. Lip for dredge-buckets. Leonard G. Attenborough, Ipoh, Perak, Federated Malay States, and John F. Newsom, Palo Alto, Cal.

1,430,790. Rock and sand heater and grader. Jesse J. Brown, Hayward, Cal.

1,430,942. Engine trip for steam shovels. Chester A. Chancellor, Loren G. McMannama, and Carley E. Houghton, Mindenmines, Mo.

1,430,975. Sand and gravel spreader. Anthony Fricker, Cleveland, Ohio.

1,430,984. Drag-line cableway excavator. William E. Hale, Detroit, Mich.

1,430,985. Bail for skip-hoist buckets. William E. Hale, Fort Washington, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa.

Shovel Operating Cost

This Question To Be Settled by Prize Contest Announced By Manufacturer

The Erie Steam Shovel Company expects to render a real service to all owners of excavating equipment by getting together many actual maintenance cost records and publishing them in detail. To secure these actual records they have just announced a prize contest, prizes to be awarded for the best upkeep records. There are twenty prizes, ranging from $100 and a Waltham watch for first prize, $50 and a Waltham watch for second prize, down to $5.00 for twentieth prize. In addition, $5.00 will be given for every record that does not win a prize but is published.

Contractors have from time to time accused equipment manufacturers of too much optimism in giving out figures on maintenance costs. The Erie Steam Shovel Company now proposes to remove all doubt about actual upkeep costs.

The judges of the contest will be Arthur S. Bent, of Bent Bros., the well known contracting firm of Los Angeles, Calif., Halbert P. Gillette, editor of Engineering and Contracting and author of the "Handbook on Excavation Costs" and many other works on costs; and A. C. Vicary, vice-president of the Erie Steam Shovel Company, mechanical engineer with many years of specialized experience on steam shovel work.

The prize contest closes December 31st. Records may be sent in by steam shovel owners, managers, or any employee in direct contact with steam shovel work. In every case, however, the record must be accompanied by a written statement from the owner of the machine to the effect that the figures submitted are correct to the best of his knowledge. The record should include opproximate number of days the machine has worked, yardage moved, and class of materials, and all upkeep costs exclusive of cable, dipper teeth and grate bars.

Complete information concerning this contest can be secured from the Erie Steam Shovel Company, Erie, Pa.

Oil Engines for Dredges

At the National Drainage Congress, held in Kansas City in September, the use of oil engines for dredges was the subject of a paper by Geo. B. Massey, consulting engineer, Chicago, a summary of which has been given by *Engineering News-Record* as follows:

In dredges operated by oil engines the engine may drive the machinery directly by means of clutches or it may drive an electric generator supplying current to motors for the different mechanisms. In the former case a belt drive is usually employed owing to the distance from the engine to the machinery. In the latter case there may be one main generator or a separate generator for each motor. Although this second arrangement is more expensive it uses less power since no resistances are required for control. In fact it is considered better than a steam engine in the relations of torque and speed. On a dipper dredge the oil-engine occupies the position of the boiler in a steam machine.

Most of the oil-engines used in this class of work are of the semi-Diesel type, and in the vertical engines the air for scavenging the cylinders is compressed usually in the crankcase to about 2 lb. pressure. A modified horizontal design has a separate compressing chamber, which arrangement permits of higher pressures. To start the engine, an electric heating coil is used or a torch to heat a plug in each cylinder head. With the straight Diesel engine the charge is ignited by the temperature due to high pressure of air in the cylinder.

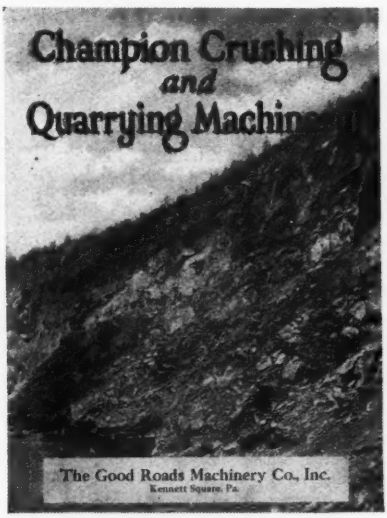
In a two-cycle engine, firing a charge at each outward stroke, the piston acts as the inlet and exhaust valve, so that there are few moving parts. A four-cycle engine, with a charge fired at each alternate outward stroke, requires valves and camshafts. Most of the semi-Diesel engines are governed by regulating the oil charge according to the load. They have to be started usually by air at 150 to 175 lb. pressure, so that an air compressor must be attached to the main engine or driven by a small independent engine.

A little water in the cylinder permits of higher compression and increases the fuel economy, but it should not be used if the oil is high in sulphur as the combination of sulphur and

water is destructive to the cylinder walls and piston rings. Some engine builders stipulate that the oil used shall contain not more than 0.5 per cent sulphur. Oil companies have special brands of oil suitable for internal combustion engines and engine builders recommend the use of oils meeting certain specifications. The heavier the oil, the lower the price and the greater the B.t.u. Using a heavy oil in summer and a light oil in winter obviates the necessity of installing a heater to warm the heavy oil so that it will flow readily.

New Catalog of Good Roads Machinery Co.

"Champion Crushing and Quarrying Machinery," the new catalogue of The Good Roads Machinery Company, covers very thoroughly the line of equipment that this company manufactures for use in crushed stone plants and quarries. The book begins with descriptions and illustrations of a Champion crusher which has been on the market over thirty years. Six thousand of these crushers have been put into heavy service since the first crusher was built, and no changes have been made in design. Improvements have been added to the details of construction but operating principles remain unchanged. Six pages in the early part of the book are given over to this general description of the Champion crusher, covering its various features and explaining their advantages by text and illustration. After this general descriptive matter comes the section on the number 20 Champion, which has a capacity of 110 to 140 tons per hour when the jaws are set to close to 4 inches. After the section on crushers comes a page on rock drills, illustrated by one of the machine that The Good Roads Machinery Company furnishes to the trade. Then follow two pages on the relative advantages of the jaw crusher and the gyratory crusher. The next section, that devoted to Champion elevators, is one that the company introduces by the statement that, if there is one thing they pride themselves on more than another, it is their elevator. Elevators are furnished for all classes of work and are designed to operate under all conditions. The company's revolving screens are described and illustrated sufficiently to give a good idea of their construction. A number of pages are devoted to portable outfits, to the winding drum and dump car, to rubber belt conveyors, to chutes and gates for bins,



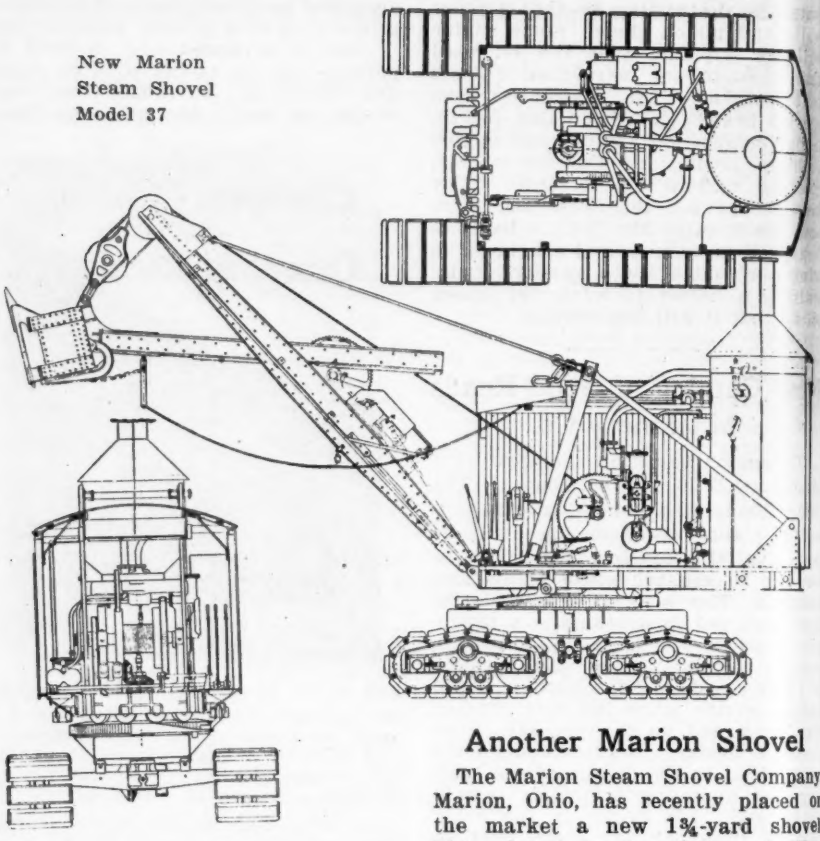
and finally to engines and boilers. Six pages at the end of the book are devoted to useful statistical information and to views of plants in which equipment furnished by The Good Roads Machinery Company is in use.

In the preface to the catalogue the company draws attention to the fact that a competent and experienced corps of engineers are always at the service of customers. The company designs, builds, and installs any kind of rock crushing, elevating, screening and conveying plant that may be called for. They have studied and worked with machinery of this character for more than thirty years and are well qualified to pass upon any problem that may arise in the construction of a crushing plant.

Copies of "Champion Crushing and Quarrying Machinery" may be secured by writing The Good Roads Machinery Company, Kennett Square, Pennsylvania.

The Bay City Dredge Works, Bay City, Mich., have made arrangements with the R. H. Hyland Company, 323 North Wells Street, Chicago, for this company to act as their representative for Chicago and vicinity.

New Marion
Steam Shovel
Model 37



New Sales Engineer

Mr. J. B. Clark, Jr., has recently become associated with the Pennsylvania Crusher Company as sales engineer, and will have charge of the New York office, Hudson terminal, 50 Church Street, New York City.

Since graduating from the Engineering Department of Penn State, Mr. Clark has had broad experience in plant erection and operation.

The Link-Belt Company of Chicago, Philadelphia and Indianapolis, announces the completion of a new General Catalog No. 400, which embraces their entire line. It contains 832 pages, is cloth bound and can be obtained from any Link-Belt Branch office. This catalog not only includes the complete Link-Belt line, but also the products of the H. W. Caldwell & Son Company plant of that company.

Another Marion Shovel

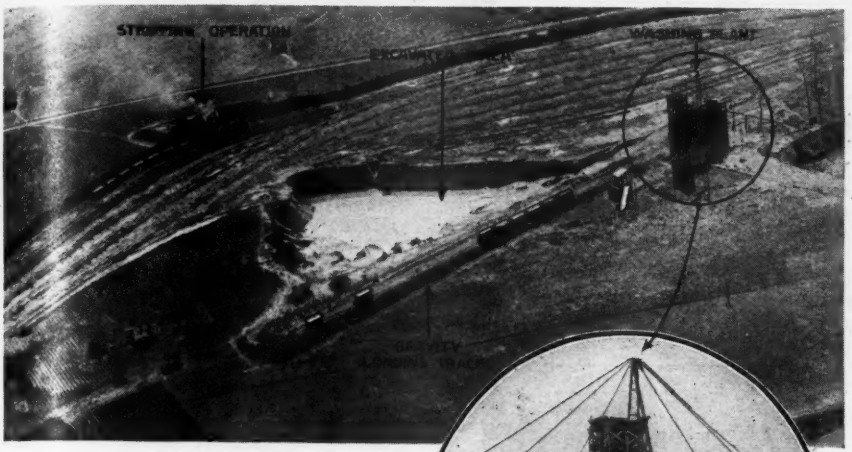
The Marion Steam Shovel Company, Marion, Ohio, has recently placed on the market a new 1¾-yard shovel. This shovel is described and illustrated in Bulletin No. 304, which is now ready for distribution.

It is known as Model 37 and carries as regular equipment a 25-foot boom, 17-foot dipper handle and 1¾-yard dipper.

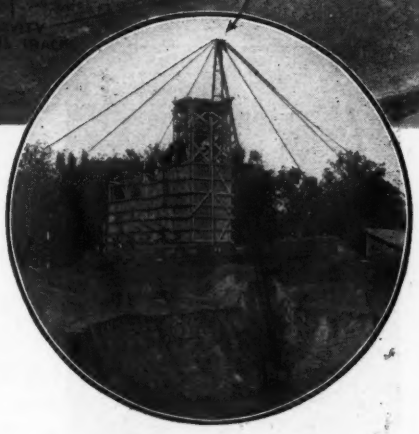
It is readily convertible into dragline, clam-shell or orange-peel excavator, or material handling crane, and can be furnished with either rigid or flexible crawler, mounted traction wheels or railroad wheels.

This is the company's largest model in this type and it is easy to handle and recommend for its absolute reliability.

The Rochelle Washed Gravel Co., a company formed by Mr. C. W. Clark and Fred E. Gardner, has leased a gravel deposit four miles south of Rochelle, Ill. The equipment is being installed.



Premier Sand and Gravel Company
Birmingham, Ala.



CLEAN GRAVEL
BETTER CONCRETE
PERMANENT ROADS

GOOD concrete construction depends upon clean sand and gravel, properly graded, and free from vegetable matter and other foreign substances.

The airplane view above shows a modern plant for screening and washing sand and gravel.

A steam shovel strips the overburden and loads it into cars. The gravel is excavated with a dragline cableway bucket which dumps into a Link-Belt washing plant.

Three sizes of gravel and two sizes of sand are produced. The Pittsburgh Testing Laboratories report of concrete made from this product gives it a tensile strength of 137% and a compression test of 111%, which means good concrete and roads that are good when the bonds are retired.

Let our engineers figure with you on your problem.

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LINK-BELT COMPANY

Chicago—300 W. Pershing Road Philadelphia—Hunting Park Ave. & P. & R. Rwy.

LINK-BELT

Sales Manager of Northwest Engineering

C. R. Dodge, well known throughout the construction and contracting field, has become sales manager of the Northwest Engineering Co., Green Bay, Wis., manufacturers of Northwest crawler cranes, draglines, shovels, and similar equipment, with general sales office at 28 East Jackson Blvd., Chicago.

Before accepting the present connection, Mr. Dodge was western sales

C. R. Dodge

manager for the Lakewood Engineering Company, with which concern he was connected for five years.

It was to strengthen the sales organization, in order to handle the increased volume of business brought about by the announcement of the new Northwest gas or electric shovel and other recent improvements, that Mr. Dodge's services were sought by the Northwest Company.

Mr. W. W. Mutter, vice-president, who has formerly handled the sales organization, is turning his attention to production and special problems.

The San Bernardina Valley Lime & Rock Company, San Bernardina, Calif., has been incorporated with a capital of $200,000. The incorporators are J. D. Baugh, J. W. Bates, M. P. Bates, Julia Baugh and Fred A. Wilson. The company will engage in the mining and producing of rock and limestone for building and commercial purposes.

Power Exposition

The National Exposition of Power and Mechanical Engineering to be held at the Grand Central Palace in New York, December 7 to December 13, is being planned in cooperation with the national societies interested in the economy of fuel and in the production and use of power generated therefrom.

The opening of the Exposition in the Grand Central Palace will take place on the closing day of the Annual Meeting of the American Society of Mechanical Engineers, and time has been set aside in the A. S. M. E. program so that members desiring may attend the opening exercises. Furthermore, the programs of the twenty sessions to be held at the A. S. M. E. meetings have been so arranged that all members attending the meeting may reap the advantage of the technical discussions, and with the smallest possible expenditure of time, enjoy the novel and varied exhibits at the Exposition.

Gasoline Locomotives in Three Sizes

The Mid-West Locomotive Works, Cincinnati, Ohio, successors to the Burton Engineering & Machinery Co., are planning to manufacture gasoline locomotives on a larger scale than was done by the Burton company. These will be made in three different sizes—4, 6, and 10 ton, and perhaps larger. Mr. Armstrong is president of this company and Mr. J. C. Meyer is secretary.

Mr. Martin Uldhall of San Francisco has taken a lease on a large deposit of gypsum at Ludwig, Nevada. Men are already at work cleaning up the plant and preparing a quantity of the crude gypsum for shipment. Mr. Uldhall plans to erect a refining plant with a daily capacity of 150 tons, which he expects to have completed in the early part of next year.

The Clear Lake Sand & Gravel Co., Clear Lake, Iowa, is planning to purchase new machinery and equipment and install in the plant during the winter. This will enable them to almost double their output for the past year. The company expects to float a bond issue to the extent of $30,000, which will be disposed of locally to finance their needs.